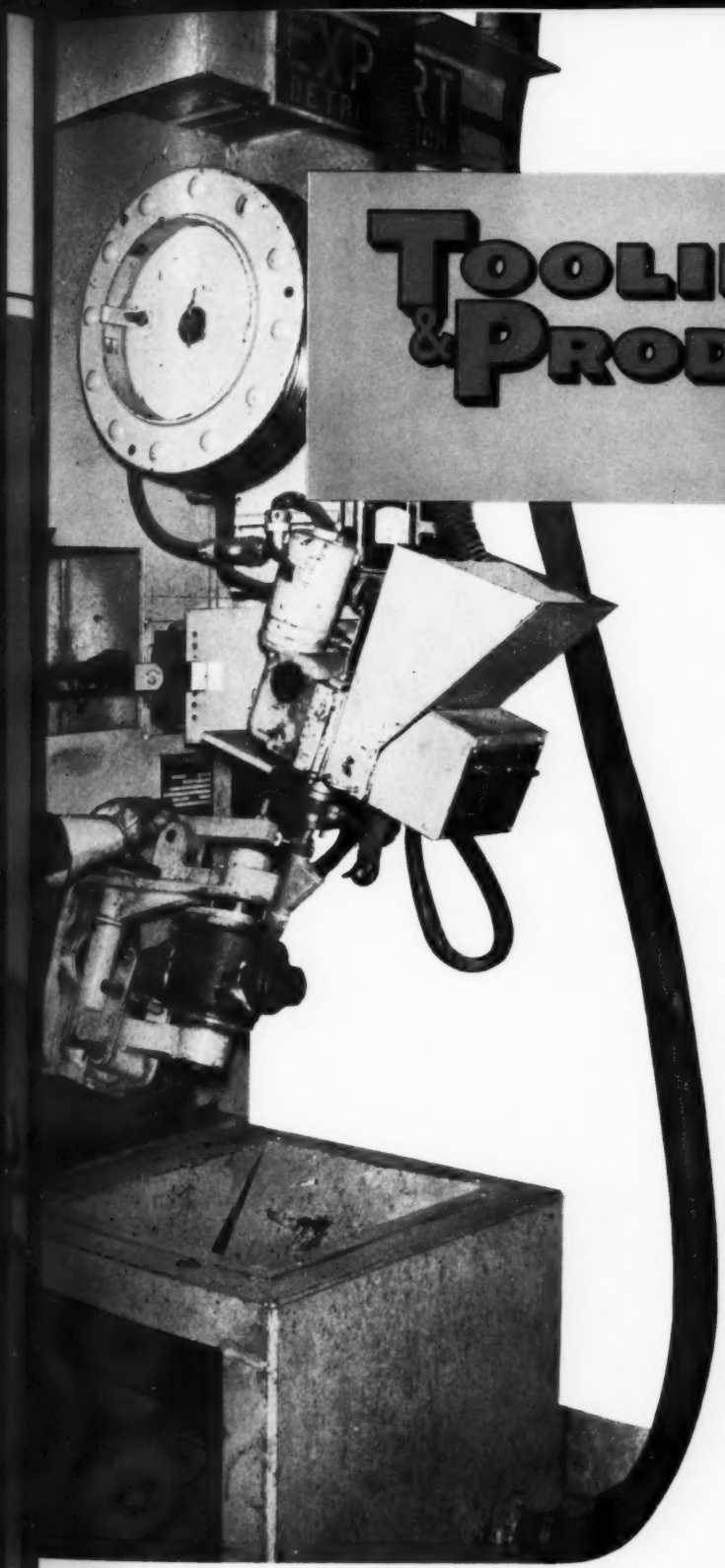
MARCH 1958

TOOLING & PRODUCTION Magazine



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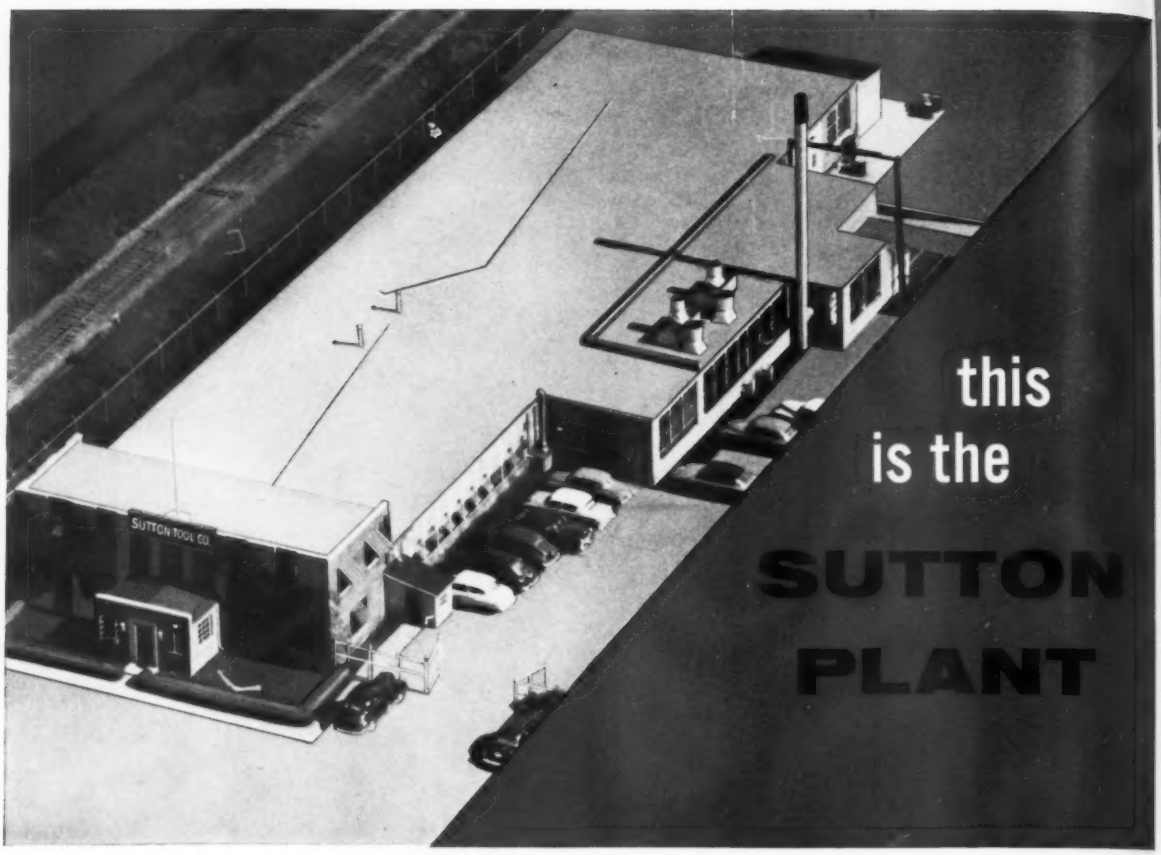

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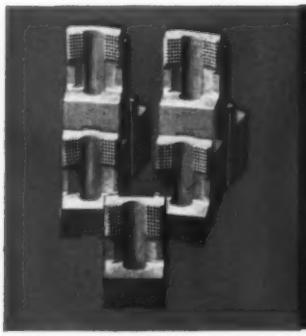

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New Tools for Miniaturization... Companion Tools for Micro-Drills

L&I announces a new line of miniature reamers which are standard in sizes from #80 (Wire Gage .0135) through #61 (Wire Gage .0390). These reamers are perfectly engineered miniatures of L&I larger straight shank straight flute reamers, ground from the solid. They are provided with end relief and are made to a tolerance of +.0002", −.0000"! They are also available in intermediate decimal sizes. A complete set of 20 reamers is also ready.

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TOOLING & PRODUCTION Magazine

MARCH 1958
VOL. XXIII—No. 12
GEORGE J. HUEBNER, Founder

PERSONALLY SPEAKING

Dear T&P Reader:

On January 30th, I had the pleasure of attending the annual State of the Nation Dinner sponsored by National Business Publications which represent about two thousand business papers having an audience of over forty million readers. The feature of this annual affair is presentation of NBP's Silver Quill Award, conferred on one exceptionally outstanding American leader.

This year, it was the privilege and honor of the business press to award the Silver Quill to Mr. Benjamin F. Fairless, for reasons obvious to all.

Mr. Fairless and the members of NBP and their guests were further honored by a head table of distinguished personalities from labor, business and government ranging from John L. Lewis to Donald W. Douglas, Sr., to Vice President Richard M. Nixon. It was, indeed, a brilliant affair and a particularly fitting one to honor Mr. Fairless.

Have you seen the Allen-Bradley Company newspaper spread which has appeared in a large group of daily newspapers in the United States to present, for the benefit of all Americans, a complete reprint of an extremely important document on the subject of international communism? It is the word-for-word testimony of Dr. Frederick Charles Schwarz before the House Committee on Un-American Activities. Dr. Schwarz is Executive Director of the Christian Anti-Communist Crusade, an organization with headquarters at Long Beach, California.

Dr. Schwarz' testimony is logical, persuasive and frightening. It makes clear how the Russian leaders justify all of their baseness and cruelty while claiming that **they** are **the** champions of peace and freedom and that they will be some day the "liberators" of all the people of the world including you and me and the other 170 million Americans.

If you have not seen this document reprinted by the Allen-Bradley Company, by all means get yourself a copy and read it, word for word. You'll be glad you did. If you can't obtain a copy, drop me a line and I'll see what I can do to get one for you.

Cordially yours,

Ray Huebner

Publisher

TOOLING & PRODUCTION

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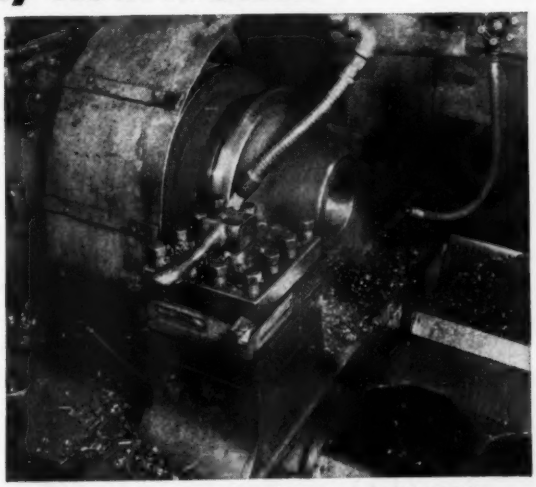

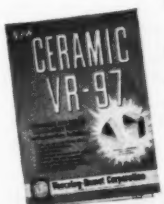

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Complete details, specifications and dimensions included in Bulletin No. 5710. Write for your copy or call your local V-R representative or distributor.

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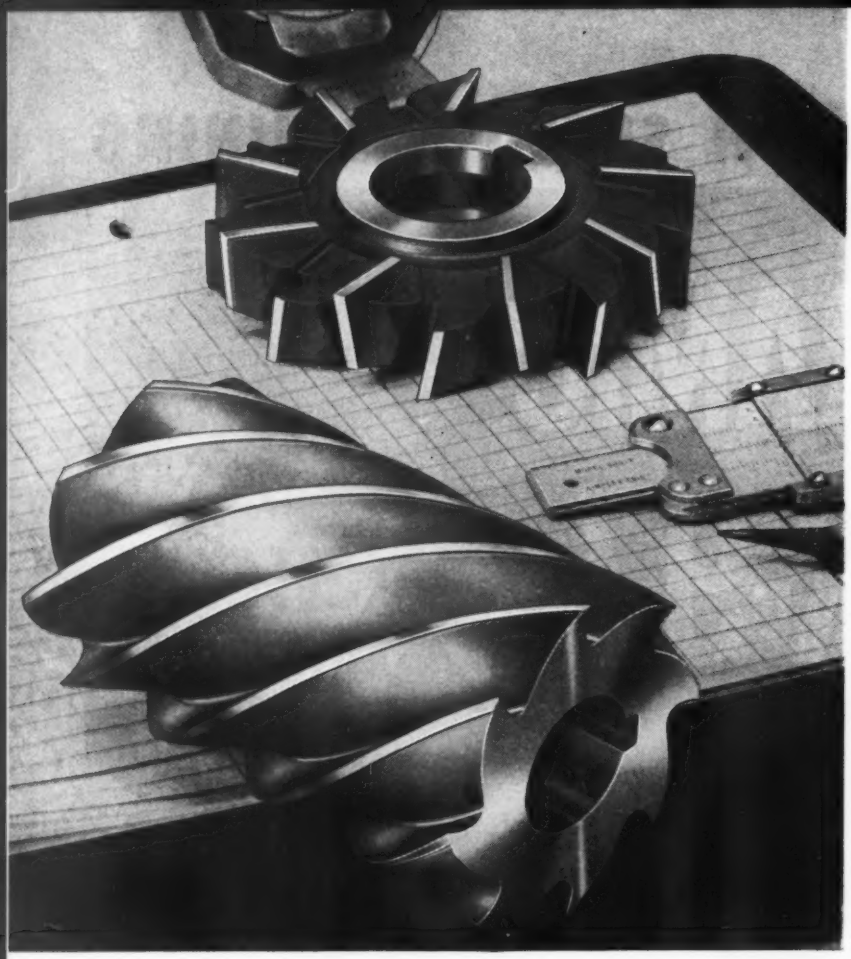

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FASTENERS HANDBOOK, by Julius Soled. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y., 1957. 438 pages, $12.50.

Often significant savings are overlooked by omitting the fastener from early design considerations. When the author began looking for data on fasteners for his own use, he found no ready source was available. He then gathered such material for his own use, and ended up compiling it into this book.

Among the fasteners the author describes and illustrates are bolts that indicate when they are fully stressed; nuts that cut their own threads; wire stitches for metal; washers that indicate when they have been squeezed a predetermined amount; nails that can be hammered easily into steel with the aid of a special holder; and blind rivets containing a chemical charge which is set with the soldering iron. The book gives detailed, illustrated descriptions of the fasteners, and sources of supply. It should be of value to designers because it will help them make economical choices of fasteners early in the design process.

INSTALLING ELECTRONIC DATA PROCESSING SYSTEMS, by Richard G. Canning. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1957. 193 pages, $6.

More and more companies are considering the use of electronic data processing systems in their operations. This book deals with the important high-cost aspects of installing such systems, and therefore should be of great value to these companies. The author covers the significant questions of fitting EDP into the organization, selecting and training EDP personnel, programming, physical installation of the system, and the early phases of operation.

Actual case studies show how to control costs effectively, and studies of a number of companies in dissimilar fields are combined in a single case history for increased value to the reader. The book is written in non-technical language and assumes that the reader is relatively unacquainted with electronic computers.

BIBLIOGRAPHY ON ADHESIVE BONDING OF METALS, ESL Bibliography No. 12. Published by Engineering Societies Library, 29 W. 39 St., New York 18, N. Y., 1957. 23 pages, mimeo, $2.

This is a selected list of over 150 annotated references to books and magazine articles published from 1947 to 1957, covering all aspects of adhesive metal-to-metal bonding, including references to theory, technology, properties, and methods of application. The references deal with applications of adhesive bonding in the aircraft industry, as well as other fields such as in the manufacture of tools, machinery parts, electrical apparatus and wiring, pistons, furniture, and so forth. TOOLING & PRODUCTION articles on adhesive bonding are included.

CLOSED CIRCUIT TV SYSTEM PLANNING, by Morris A. Mayers and Rodney D. Chipp. Published by John F. Rider Publishers, Inc., 116 W. 14th St., New York 11, N. Y., 1957. 250 pages, $10.

This jumbo-size book discusses the possibilities of using closed circuit television in almost every type of business and educational job. It answers questions relative to the organization of closed circuit TV systems — space requirements, cost of equipment and its installation, types of equipment available, and manpower needed to operate and maintain it. Advantages, disadvantages, capabilities, and limitations are plainly stated. Extensive descriptions and photographs show equipment, and how it is used in a wide variety of fields.

WORK SAMPLING, by Ralph M. Barnes. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1957. 322 pages, $7.95.

Dr. Barnes, professor of engineering and production management at the University of California in Los Angeles and author of a number of books on time and motion study, first puts down the fundamentals of work sampling, in this book, and then gives explicit instructions on how to make a work sampling study. The book also gives detailed results of research done in the field, including Tippett's "A Snap-Reading Method of Making Time Studies of Machines and Operatives in Factory Surveys." Recent reports on performance sampling made by the author and his colleagues also are included.

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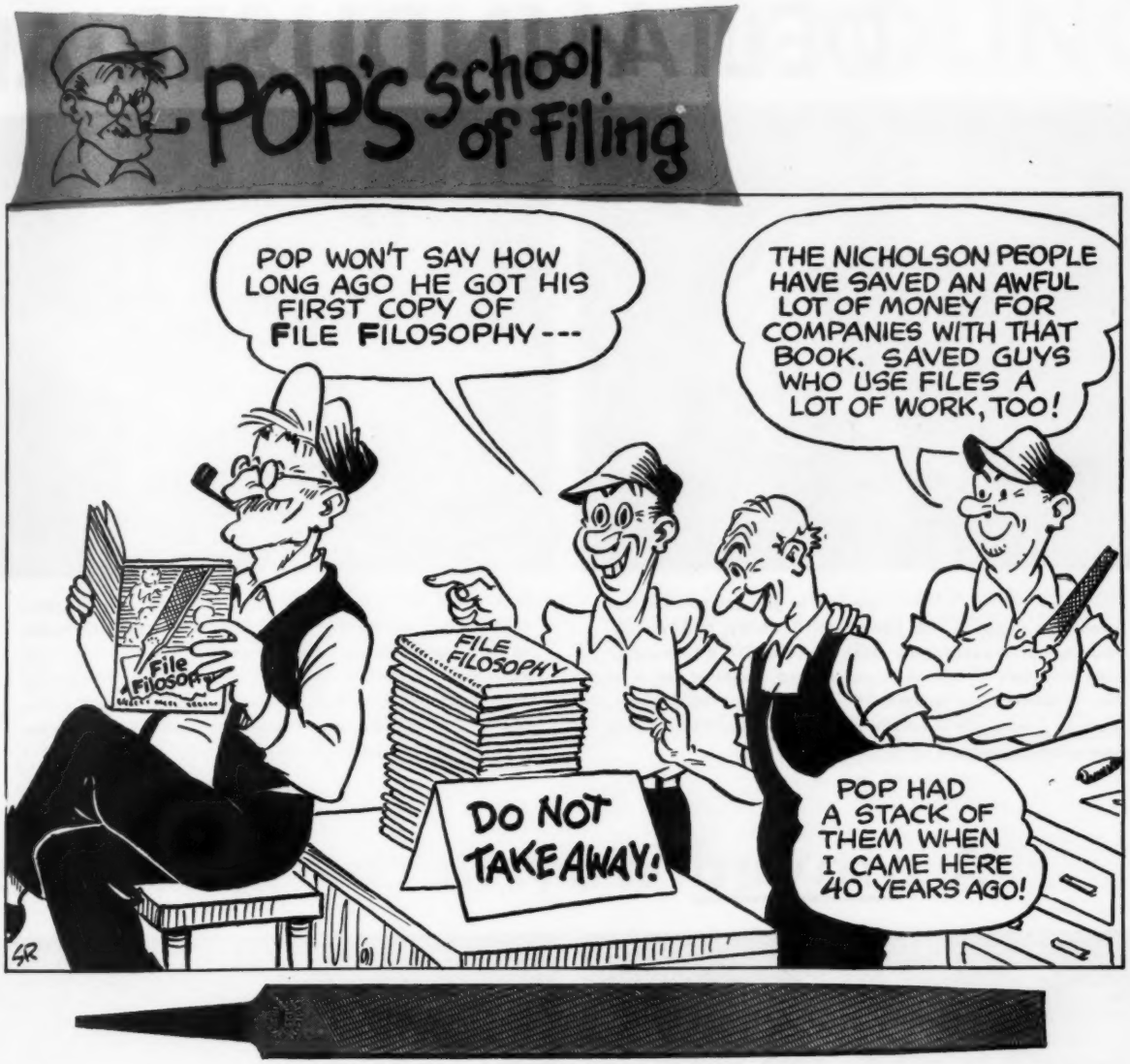
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DELTA INDUSTRIAL P

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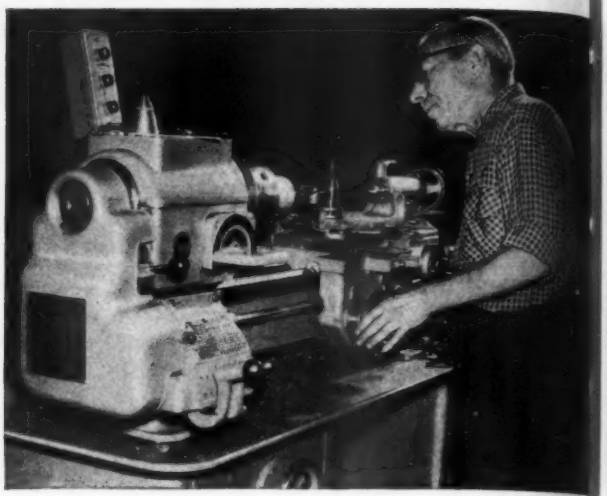
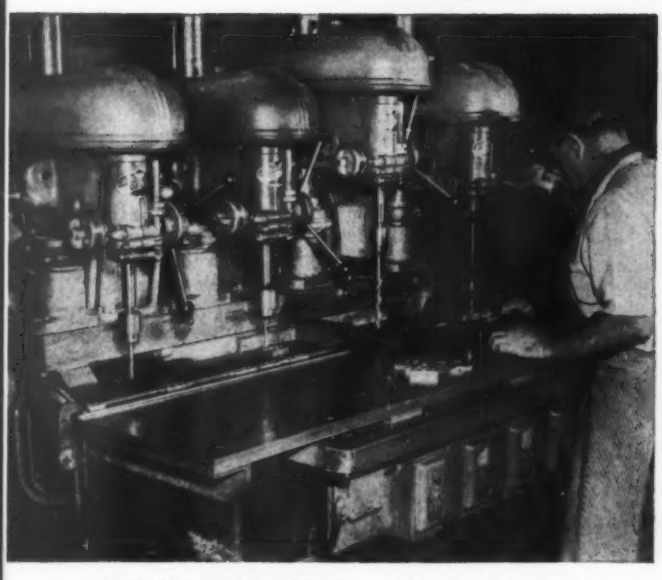
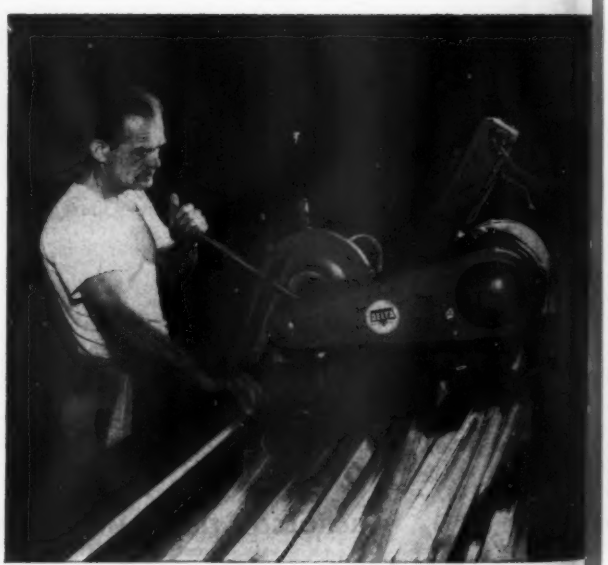


DELTA 11" METAL LATHES offer exclusive Delta Quality features such as massive head stock construction, perfected variable speed drive, unique 4-position drive selector and many more. Both 4 ft. and 5 ft. bed models available with flame hardened bed. And you get the double versatility of a ram-type turret lathe, when you add production accessories for precision multiple machining jobs.

A proved way to cut your costs o

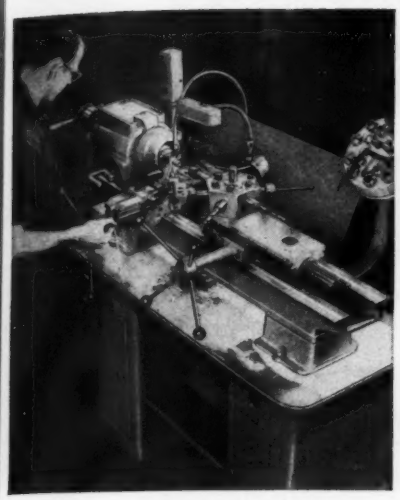


DELTA 17" DRILL PRESSES in over 70 models enable you to make your own single or multiple spindle set-up for drilling, counterboring, reaming and tapping jobs. Finest in their class, they are engineered for precision work and built for long life with low maintenance costs. Standard or power feed, high or slo speed and key chuck or tapered spindle available in floor, bench and multiple spindle models.

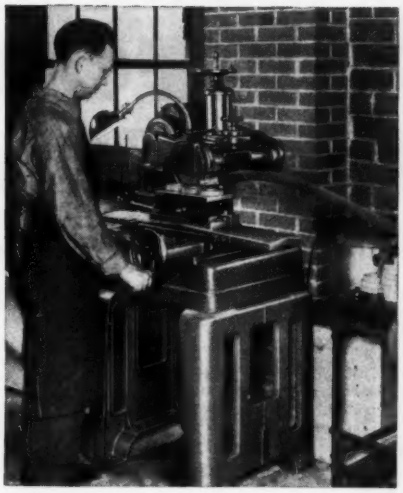


DELTA CUT-OFF MACHINES for fast, smooth, accurate cuts are speeding production and improving quality in tool rooms, maintenance departments and on production lines. Work head pivots for easy mitering. All belts, pulleys, cutting wheels or blades are fully enclosed for maximum safety. Whether you do wet abrasive or dry abrasive cutting, or cut non-ferrous metals or wood—you choose the model that's right for your job.

PRODUCTION TOOLING



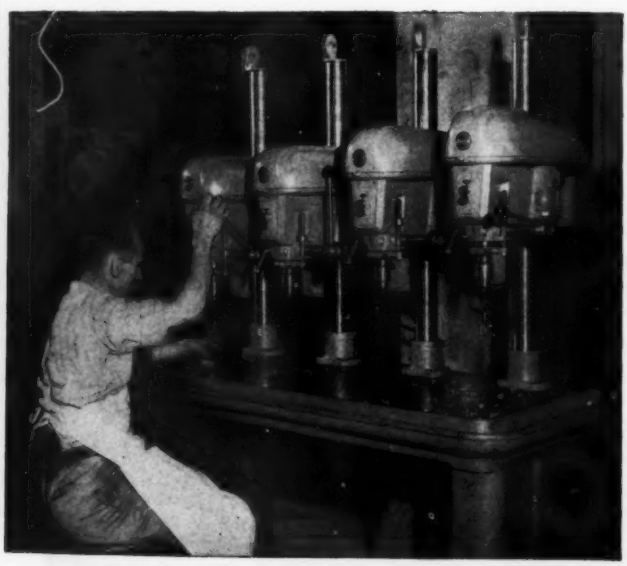
DELTA HAND SCREW MACHINES fill the production gap between standard engine lathes and expensive, automatic screw machines . . . and at lower cost than *any* comparable machine. Bed turret, double tool post cross slide and lever type collet closer are *standard equipment*. Delta Quality features throughout assure lasting precision on multiple machining jobs.



DELTA TOOLMAKER® GRINDERS perform three precision grinding operations—surface, chip breaker and tool and cutter grinding. And with Delta 6" tool grinders, 7" standard grinders and 2½" belt grinders you have a complete line of safe, accurate, low cost grinders for *every* shop need.

DELTA 14" BAND SAWS These versatile, low cost machines give you eight cutting speeds—ranging from 40 fpm for metal to 3000 fpm for wood—using a *standard* motor. They enable you to cut stainless steel, armor plate, high speed steel, cast iron, alloy steel and dozens of other materials including woods and plastics. Available with steel or cast iron stand.

on every metalworking job



DELTA 15" DRILL PRESSES offer such Delta exclusives as six spindle adapters, "universal" hand feed, counterbalanced belt guard . . . plus big, machine tool ruggedness and proven production dependability. Delta 14" utility and 14" Super-Hi Sensitive Drill Presses also available in many models.

Thousands of metalworking plants across the country are cutting costs by using Delta Industrial Tools to supplement or replace expensive, special-purpose machines. Here's why: Delta tools are ruggedly built to withstand hard, continuous wear—they offer precision performance to meet the highest production standards—yet they cost less to buy, less to operate, and less to maintain. Completely portable, Delta tools can be moved in and out of production lines to relieve bottlenecks. And any plant can have inexpensive, automated operations through the combination of versatile, standard Delta components and automatic control devices.

Because Delta is the world's most *complete* line, you can choose the *right* tools for the biggest savings on *your* jobs.

Get all the facts on how YOU can cut costs with Delta Industrial Production Tooling. Write for FREE Delta Industrial Catalog to: Rockwell Manufacturing Co., Delta Power Tool Div., 622C N. Lexington Ave., Pittsburgh 8, Pa.

See Delta Industrial Tools at your nearest Delta Dealer . . . he's listed under "TOOLS" in the Yellow Pages.

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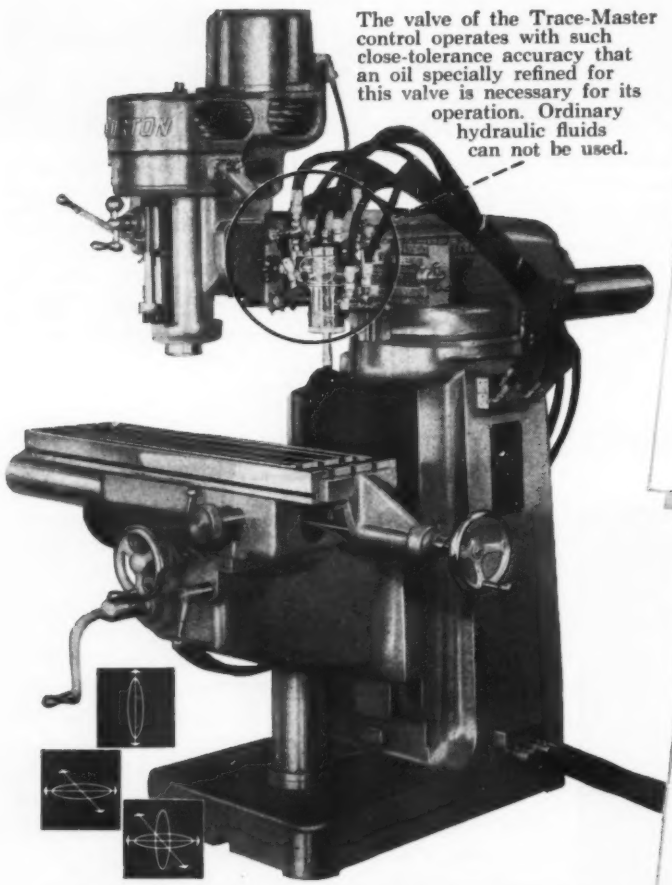
CIRCLE INFORM-A-GRAM KEY NO. 11

Designed for the *"Missile Age"*

GORTON "Trace-Master" Mastermil

with exclusive combination of sustained toolroom accuracy and precision-built Trace-Master Hydraulic tracer control



The valve of the Trace-Master control operates with such close-tolerance accuracy that an oil specially refined for this valve is necessary for its operation. Ordinary hydraulic fluids can not be used.

Nowhere Else will you find this combination

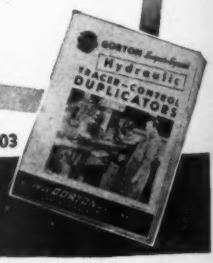
1. TWO H.P. spindle motor
2. Finest Milling Head in its class
3. 80 to 5,600 RPM spindle speeds
4. Rigidity . . . (2,800 lbs net weight)
5. Extra long saddle

Nowhere Else will you find this versatility

1. Production profiling
2. Scanning
3. Duplicating . . . die and mold work
4. Milling . . . conventional and climb
5. Boring

3 Models Available (1) 180° Vertical Hydraulic Feed to Knee (2) 360° Cross Hydraulic Feed to Ram and Longitudinal Hydraulic Feed to Table (3) 3D Hydraulic feed to knee, ram and table for 3-dimensional work.

Trace-Master controls can be furnished with the Model 1-22 Mastermil illustrated above or the Model 9-J Super-Speed Vertical Mill with single spindle, twin spindles and/or six inch higher column for additional vertical capacity.



Write for Bulletin 2771-1203

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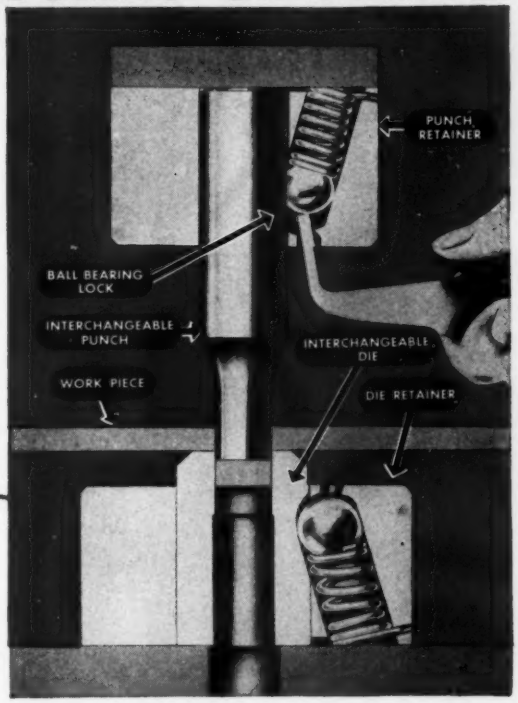
AS-1007

CIRCLE INFORM-A-GRAM KEY NO. 12

HOW R-B PUNCHES OPERATE



All R-B retainers are equipped with spring-loaded locking balls which engage the recessed portion of R-B punches and die buttons. With a simple push and a twist, R-B standardized punches and die buttons are locked in their retainers . . . they are also instantly removed. R-B punches and die buttons are always accurately aligned—no additional keying is required.

No other manufacturer of punches and die buttons can offer you the amount of successful application experience and the scope of knowledge that is available from the R-B engineering staff for:

- ★ **Cutting Your Production Costs**
- ★ **Reducing Die Designing Time**
- ★ **Increasing Productivity of Presses**
- ★ **Supplying Answers to Piercing Problems**
- ★ **Saving Die Construction Time**
- ★ **Complete Standardization of Press Tooling**

For Additional Information or Engineering Service, Write to:

RICHARD BROTHERS PUNCH DIVISION
ALLIED PRODUCTS CORPORATION
DEPT. 84 • 2407S CAPITOL AVENUE • DETROIT 16, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 13

Gardner-Denver (Keller) 000RSD and 12A-2 screw drivers with cushion clutch, magnetic bit holder and Phillips insert bit assembling dual headlights for 1958 cars.

These Air-Operated Screw Drivers Are Paying for Themselves

If you drive only 400 screws a day, a Keller air-operated screw driver, such as those shown above, will pay for itself in six months. These lightweight air tools are easier on their users . . . help them keep pace with fast-moving assembly-line work.

Despite their high load factor, Keller pneumatic screw drivers run cool always. They have the right combination of torque, adjustable clutch and magnetic holding of screws for fast, efficient driving. They are the modern way to reduce assembly-line time and costs.

Send for the 40-page booklet. This Gardner-Denver booklet gives complete information about Keller screw drivers and nut setters, as well as other Keller air tools and accessories. A copy is yours for the asking.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

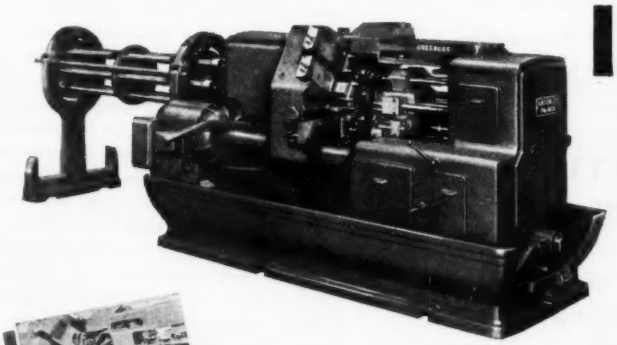
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

CIRCLE INFORM-A-GRAM KEY NO. 14

1. Simplified cross-slide camming
2. Interchangeable cross-slide tool holders
3. Quick-adjusting stroke mechanism
4. Rapid speed and feed changes
5. Wide-open, easily reached tooling area
6. Built-in threading feed and drive
7. Easily accessible main toolslide holders
8. Stationary type collets changed quickly

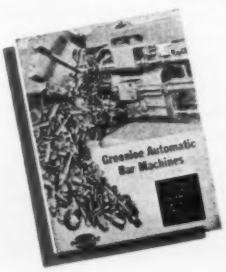
eight big reasons why you get *Fast Setups* on GREENLEE BAR AUTOMATICS

In plant after plant countless hours of setup time are saved each year on Greenlee Bar Automatics. Similar savings in time and money can be achieved in your own plant. Greenlee has on-the-job case studies to prove it. Whether your responsibility lies in the field of management . . . production . . engineering . . . or purchasing you owe it to yourself and your company to call in the Greenlee man. Let him show you why and how faster setups on a Greenlee pay off in greater profits.



PRODUCTION MACHINERY
GREENLEE

4-SPINDLE...6-SPINDLE
SECOND-OPERATION
PNEUMATIC STOCK FEED

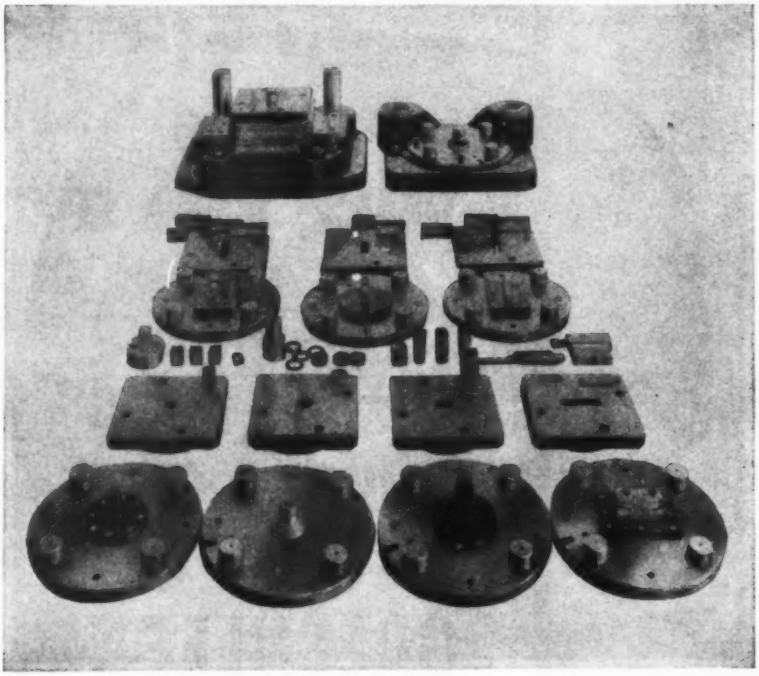


WRITE TODAY
FOR CATALOG
A-405

PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
2043 Mason Avenue
Rockford, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 15



ALL THIS FROM ONE BASIC DIE

One basic die with 8 different sets of cutting members was used to trim the 8 parts shown. Some are round, some are square, some are rectangular and the one in the die is irregular. Depths vary from ¼" to 3". **Only one basic die is used.**

A Brehm "Shimmy" Die with angular cams can be designed for almost anything you need trimmed — fountain pen ferrules, artillery cases, watch cases, burial vaults, automotive, kitchen, radio and television accessories and parts. *Send part prints for quotation on Brehm "Shimmy" and related dies, such as blank, form pierce.*

THE SHIMMY DIE — VULCAN TOOL COMPANY — PATENTED U.S. PATENT OFF.

Brehm® trimming dies

ENGINEERING • PROCESSING • BUILDING • TOOLS
DIES • SPECIAL MACHINES • VULCANAIRE JIG
GRINDERS • MOTORIZED ROTARY TABLES • BREHM
"SHIMMY" AND RELATED DIES • AUTOMATION

VULCAN TOOL CO., YOUR TOOL ROOM IN DAYTON
BREHM DIE DIVISION • 731 LORAIN AVENUE • DAYTON 10, OHIO

VULCAN tools

CIRCLE INFORM-A-GRAM KEY NO. 16

"Commendable Comments"

". . . real progress will be made only if all branches of science move forward together in an unbroken front. I would venture to say that there has been no great advance that was not a synthesis of knowledge laboriously accumulated in many different disciplines—a cooperative fusion of many branches of knowledge. For science, like freedom, is indivisible, and freedom in science is just as essential as freedom in any other area of human endeavor. . . . American science is not a weapon, its edge sharpened for military aggression, but a plowshare tilling the peaceful fields of our normal lives. It has been well demonstrated that our capacity to produce in time of peace is our greatest weapon in time of emergency or war. Hence, strength in war, strength in peace, and strength in science become synonymous."

—Crawford H. Greenewalt, president of du Pont de Nemours & Co., addressing Sigma Xi and the Scientific Research Society of America at the annual meeting of the American Association for the Advancement of Science, in Indianapolis.

◆

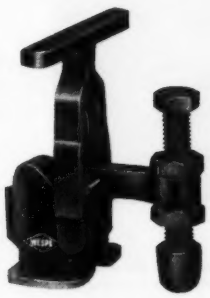
"According to current estimates . . . 68% of metal cutting type and 65% of metal forming type machine tools now in use on plant floors in this country are over 10 yrs. old, and 17% of metal cutting types and 35% of metal forming types are over 20 yrs. old. . . . With present tax rates, a company can never recover more than 52% of the cost of a machine through depreciation. Faster depreciation can only increase the cash flow on 52% of the investment—nothing more. The remainder of the cost of the machine, a whopping 48%, must be recovered through earned profit. Furthermore, a new machine may pay for itself, many times over, long before 52% of its purchase price may be recovered through depreciation. . . . The rate of research and product development within the machine tool industry is today so rapid that a machine that many a company thinks is 'good enough' today will not be good enough for tomorrow."

—Jerome A. Raterman, president National Machine Tool Builders' Association and chairman of the board and president of the Monarch Machine Tool Company, speaking to members of the Association at its 50th Annual Meeting at French Lick, Ind.

CATALOGS ON
TOGGLE CLAMPS
FIXTURE CLAMPS
LEAF JIGS

Only WESPO can furnish All the following work-holding devices

Write for FREE CATALOG!

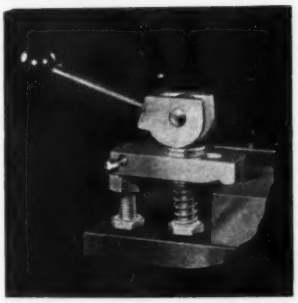


TOGGLE CLAMPS AND PLIERS

Over 80 STYLES and SIZES . . .

NOTE THESE FEATURES:

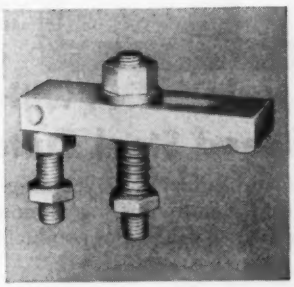
1. Reamed holes—for better bearing.
2. Hardened Bushings, Serrated to prevent turning.
3. High tensile strength rivets—for longer service.



FIXTURE CLAMPS

Over 170 STYLES and SIZES . . .

There is a WESPO Clamp Assembly to suit every job.



See us at the A.S.T.E. Show — Booth 1757

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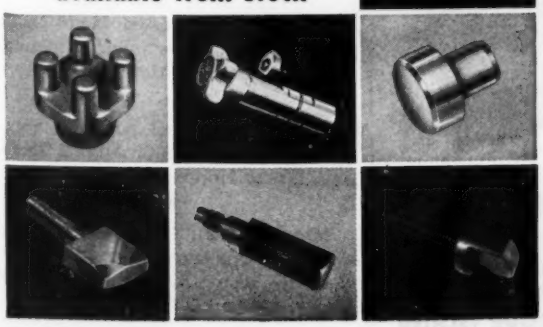
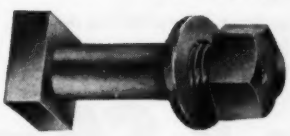
Over 1000 different Types and Sizes available from stock



LEAF JIGS

Save 50% Designing Time and Toolmakers Cost.
23 Sizes, 1½" x 2" to 6" x 6".



T-BOLTS AND BOLSTER BOLTS

Made to J.I.C. Press Room Standards.

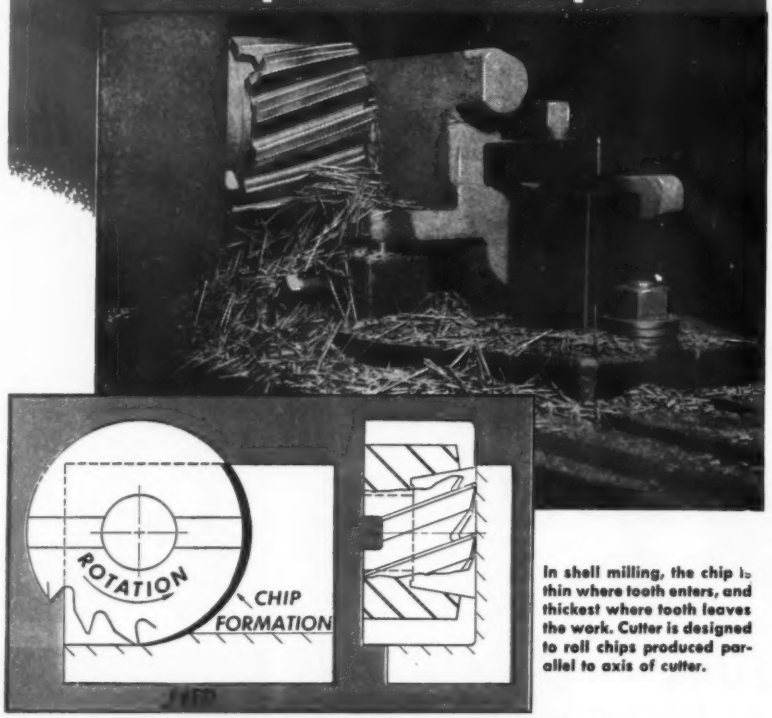
WEST POINT MFG. CO.

26935 W. 7 MILE ROAD • DETROIT 19, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 17

Brown & Sharpe – NELCO *A Tremendous Tooling Team!*

Cutter Design Pays off in Chip Size... Shape!



In shell milling, the chip is thin where tooth enters, and thickest where tooth leaves the work. Cutter is designed to roll chips produced parallel to axis of cutter.

Mill 2 surfaces... with 1 High Speed Steel Cutter

You can often save time and money by machining two surfaces at once with one shell end mill. But this milling economy is impossible without an accurate, rigid cutter capable of producing a good finish on both work surfaces.

A correctly designed cutter will make the long continuous chip shown here, giving a cooler running cutter and a superior surface finish. Brown & Sharpe Shell End Mills are PRODUCTIONEERED with correct rake angles and precision ground chamfered edges—for smoother chip flow, longer cutter life.

Don't let "almost-as-good" high speed steel cutters steal your milling profits! For top performance, economy and reliability, always specify Brown & Sharpe PRODUCTIONEERED Cutters.

B·S *Write for new 96 page Brown & Sharpe Catalog showing over 2300 High Speed Steel Tools and Accessories.*

BUY THROUGH YOUR LOCAL DISTRIBUTOR

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PRECISION TOOLS AND GAGES • MILLING, GRINDING AND SCREW MACHINES
CUTTERS • MACHINE TOOL ACCESSORIES • GEAR, VANE AND CENTRIFUGAL PUMPS

BROWN & SHARPE MFG. CO. • PROVIDENCE 1, RHODE ISLAND

Coming Events

Mar. 3. Cleveland Engineering Society. 15th Annual All-Day Machine Design Conference. Cleveland Engineering Society Building, Cleveland.

•

Mar. 3-5. American Management Association. Electronics Conference and EDP Equipment Exhibit. Statler Hotel, New York City.

•

Mar. 3-6. American Society of Mechanical Engineers. International Gas Turbine Power Division Conference and Exhibit. Shoreham Hotel, Washington, D. C.

•

Mar. 4-6. Society of Automotive Engineers. National Passenger Car, Body, and Materials Meeting. Sheraton-Cadillac Hotel, Detroit.

•

Mar. 5-7. American Management Association. Special Conference on Employee Benefits. Drake Hotel, Chicago.

•

Mar. 9-11. American Machine Tool Distributors Association. Spring Meeting. Roosevelt Hotel, New Orleans.

•

Mar. 9-14. National Association of Manufacturers. Institute of Industrial Relations. Hollywood Beach Hotel, Hollywood Beach, Florida.

•

Mar. 11-12. Pressed Metal Institute. Spring Technical Meetings. Sheraton-Cadillac Hotel, Detroit, Michigan.

•

Mar. 11-13. Instrument Society of America. Pittsburgh Section. Annual Conference on Instrumentation of the Iron and Steel Industry. Roosevelt Hotel, Pittsburgh.

•

Mar. 12-14. Pressed Metal Institute. Spring Technical Meeting. Sheraton-Cadillac Hotel, Detroit.

•

Mar. 17-18. Steel Founders Society of America. 56th Annual Meeting, Drake Hotel, Chicago, Ill.

•

March 17-21. Engineers Joint Council. Nuclear Congress. International Amphitheatre and Palmer House, Chicago.

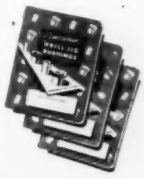
CIRCLE INFORM-A-GRAM KEY NO. 18

The Candy with the Hole in the Middle

*The Drill Bushing with the Hole in the Middle **

* Our 100% concentricity inspection means every hole is EXACTLY centered. Another "Life Saver" for you!

American
DRILL BUSHING CO.
5107 Pacific Boulevard
Los Angeles 58, Calif.



SEND NOW FOR FREE COPIES OF OUR NEW CATALOGS

SEE US IN PHILADELPHIA — BOOTHS 1749 AND 1753 — 1958 ASTE TOOL SHOW, MAY 1-8

CIRCLE INFORM-A-GRAM KEY NO. 19

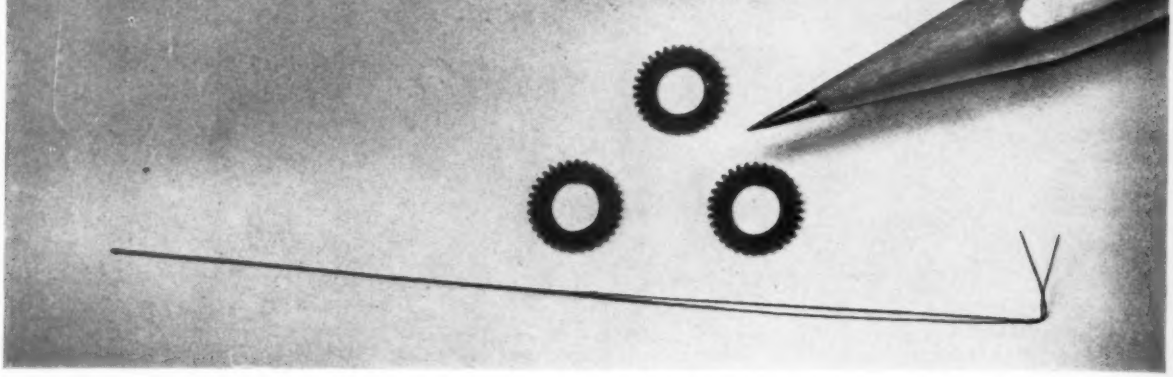
Production Inspection is Faster and Easier with a J&L Optical Comparator

. . . and its extreme versatility enables you to perform inspections that used to be "impossible"!

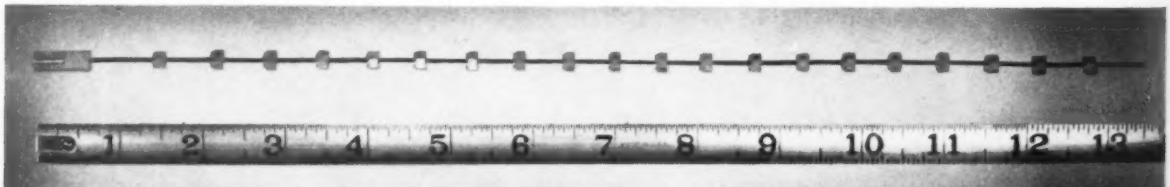
More and more electronics manufacturers throughout the country are using Jones & Lamson Optical Comparators in their quality control operations. Small shops, as well as the giants, have learned that a J&L Comparator pays for itself in very short order.

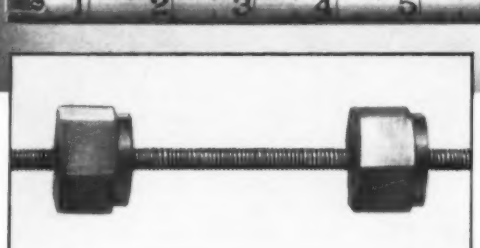
The Comparator's ability to measure and inspect, through shadow magnification, all sorts of parts and objects with extreme precision and speed makes it ideally suited for checking electronics components, especially those which are tiny or intricately contoured.

Investigate how the J&L Comparator can help you make your production operations more efficient . . . and more profitable. Write today for a free copy of our new illustrated catalog No. 5700.

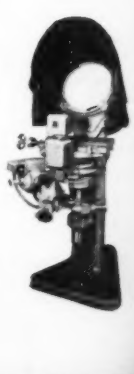


For Instance — A customer writes: "One of our assemblies, containing 32 separate circuits, measures only $\frac{5}{16}$" dia. by 1" long. The parts which go into this assembly must have perfect shape and tension, which are impossible to check by mechanical means. Two such parts are these .005" dia. gold wires, and precisely toothed brush spacers. Since using the J&L Optical Comparator in our inspection, assembly failure due to malfunction of either of these two parts has virtually disappeared."





This precisely-threaded rod (used in calculating machines) is of .047" dia. stock, 120 pitch, with continuous threading along its entire 12" length. Threading accuracy and critical dimensions are measured and checked speedily and efficiently with a J&L Comparator.



Model PC-14

JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, Dept. 710, 519 Clinton Street, Springfield, Vermont

CIRCLE INFORM-A-GRAM KEY NO. 20

FILMS TO SEE

"It's Easy to Bend" is a 17 min, 16mm color movie describing bending as a basic metalworking process: why it is important, where it has made contributions, and how it is done. The principle and function of bending, the basic types of bends, and several types of bending tools are discussed. The film is available on a free loan basis or for purchase from O'Neil-Irwin Mfg. Co., 626 8th Ave., Lake City, Minn.

•

Welded steel tubing is the subject of a 16mm sound film. It shows structural advantages, manufacture, fabricating methods, and uses of welded steel tubing in numerous applications. The booklet, "The Leading Role," based on the movie, or the film is available from Formed Steel Tube Institute, 850 Hanna Bldg., Cleveland 15.

•

"A Production Cut-Off Band Saw" features the 24" capacity, heavy-duty Model 24 power saw. The 16mm film shows how cost-cutting methods are applied to basic cut-off operations by using the 2" wide high-speed steel saw band to cut large billets, rails, bars, and structurals. The machine is shown cutting various alloys, and cutting rates, etc. are given. Write to The DoAll Co., Des Plaines, Ill., for information.

•

The roll of modern coolants in cutting and grinding procedures is the topic of the film, "The Necessary Nuisance." It answers questions encountered in machining with modern cutting and grinding fluids. Information is also included about the effect of various concentrations of different types of coolants on cutting and grinding wheels. Contact Master Chemical Corp., 13 Huron St., Toledo 1, Ohio, for information.

•

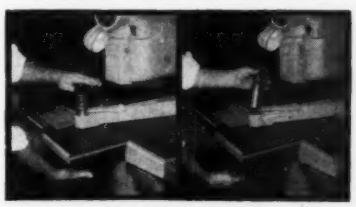
A 92-frame slidefilm points up the over-all scope of new product development by presenting the questions that should be asked by research, engineering, sales, and manufacturing people about new products. A script and handbook, "Finding, Screening and Appraising New Products," are also available. Write to American Management Association, 1515 Broadway, Times Square, New York 36, for more information.

THE STRIPPIT FABRICATOR — a single compact multi-purpose Punch Press with quick-change tool holder, quick-set gauging and stops.

Short run? Complicated pattern? If it's sheet metal up to ¼" mild steel, if it's punching, notching or nibbling, it's profitable on a Strippit Fabricator!

Set up in minutes! Punches and dies are changed in 30 seconds or less, and Strippit guided punches need no aligning or adjusting. Back stop with precision gauge is instantly set by a locking knob. Self-tripping finger stops on gauge bars provide multiple stopping as the work is moved rapidly under the punch. A switch gives you single punching or 165-stroke-a-minute nibbling, and all tools are within quick reach in attached "file drawers" or shelves. The Fabricator is more than a one-machine shop — it's a whole system of quick-change, high-profit fabrication used by thousands of shops.

What's more, you can add the Strippit Positive Duplicator for high-speed punching in medium runs — plus the Dupl-O-Scope to punch Duplicator templates right from the drawing, in a few minutes. Write today for details and demonstration at your plant by the Strippit mobile unit. Warehouse stocks in Chicago and Los Angeles.



TOOL HOLDER is pulled out, for instant removal of die and punch assembly, ready for the next interchangeable tool. 1¼" diameter capacity holder shown, 3½" diameter holder also available.

UNIT OF HOUDAILLE INDUSTRIES, INC.

WALES STRIPPIT COMPANY

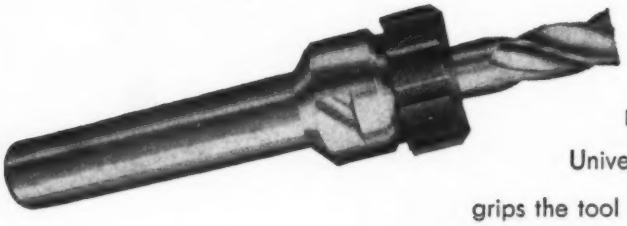
212 Buell Road, Akron, New York

In Canada: Strippit Tool & Machine Limited, Brampton, Ontario

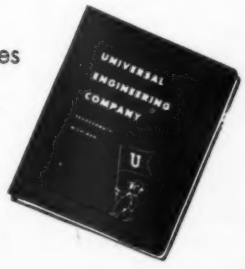
CIRCLE INFORM-A-GRAM KEY NO. 21

FOR A REAL GRIP

USE UNIVERSAL COLLET CHUCKS



A sure, solid grip on tools is provided by the wrap-around action of Universal chucks because the slotted collet grips the tool on a continuous surface the full length of the collet. Tools can't slip and tool shanks don't get scored. Even tool stubs and broken drills can be used successfully. Sizes range from 1/16" to 1 1/2", with shanks to fit any machine. Simplified design results in low chuck cost to you. Write today for new "complete line" catalog.

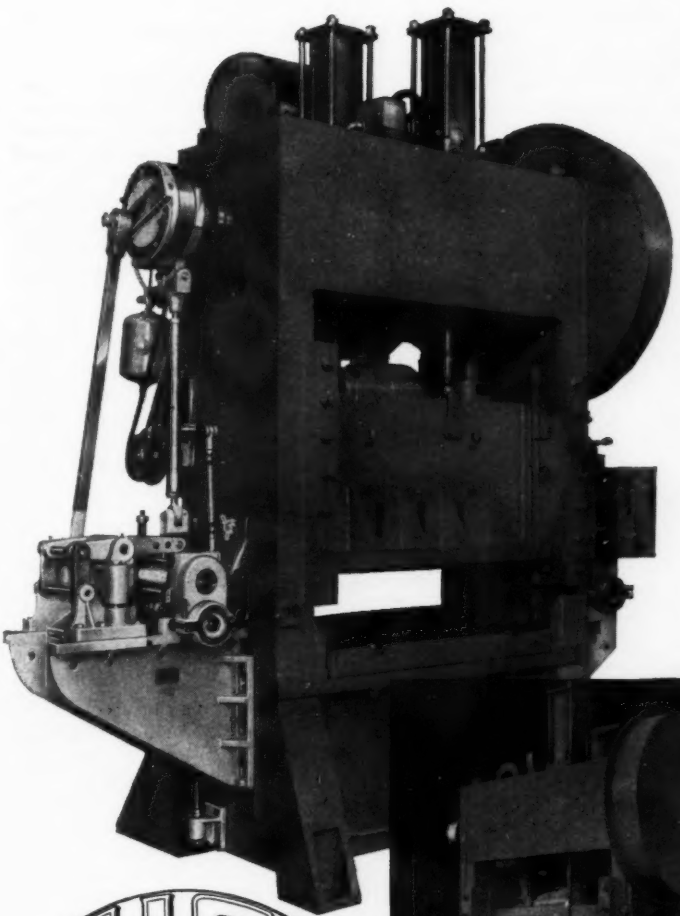


UNIVERSAL ENGINEERING CO. Frankenmuth 8, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 22

FOR CONSISTENT PERFORMANCE

U. S. Style "B" Roll Feeds

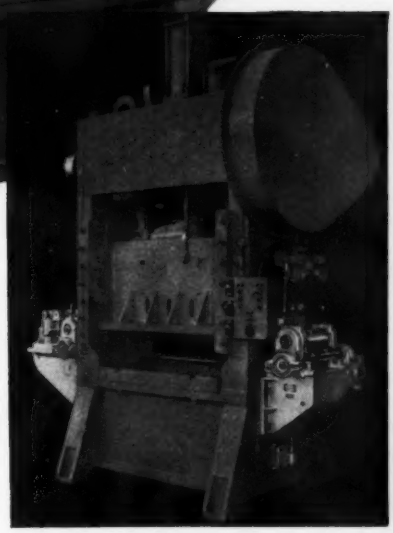


The introduction of U. S. Tool Company Style "B" Roll Feeds brings to your Press-Room a new line of Rack and Pinion Roll Feeds in a range of sizes to keep pace with most production requirements.

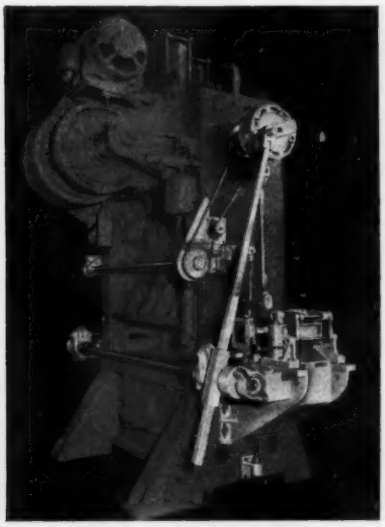
U. S. Style "B" Roll Feeds are made in both double and single types, with bolster plate for O.B.I. presses or with adjustable mounting brackets for straight side presses.

All Style "B" Roll Feeds are equipped with hardened and ground rolls of hollow construction, which are driven by hardened spiral gears running in oil. These gears are mounted in an enclosed housing. The roll-pin type over-running clutch has carbide inserts. Standard equipment also includes manual roll lifters; self-equalizing brakes; two-piece adjustable driving eccentric to simplify timing the feed in relation to the motion of the ram of the press; stock oiler and eccentric operated scrap chopper. Automatic roll lifters are available in either ram operated or adjustable eccentric operated types.

For full information regarding the U. S. Style "B" Roll Feeds write for your copy of Bulletin 85-P.



U. S. Style "B" double Roll Feed Model No. RF-1212, with scrap chopper mounted on a modern straight side press. This particular installation handles stock widths up to 12", with feed length adaptable up to 12".



Rear View: Showing the rack and pinion mechanism and cross members for actuating the entering feed and eccentric operated roll lifters. One of 5 models of U. S. Style "B" Roll Feeds will fit your Press Room Eqiupment.

US PRODUCTS

Slide Feeds
Roll Feeds
Stock Straighteners
Stock Reels
Stock Oilers
Coil Cradles
Wire Straighteners
Die Sets
Multi-Slides®
Multi-Millers®

U. S. TOOL COMPANY, INC.

AMPERE *(East Orange)* NEW JERSEY

CIRCLE INFORM-A-GRAM KEY NO. 23

GROWING PAINS

Bell Aircraft Corp. has begun construction on a $2,500,000 addition to its main plant located near Niagara Falls. The addition will contain about 220,000 sq ft of floor space.

Detroit Harvester Company will build a 32,000 sq ft building. The structure will provide for executive offices, engineering facilities, and new testing and research laboratories.

The Hamilton Watch Company is installing $300,000 worth of special equipment in a major expansion of its Metals Products Department, to provide industry with higher volume production of precision metallurgical services.

American Steel Foundries expects to spend $11,000,000 for plant additions this year. Plans include two new steel wheel plants, one for **Griffin Wheel Co.** in Kansas, with annual capacity of 120,000 steel wheels, and the other for **Griffin Steel Foundries Ltd.**, in Canada, with annual capacity of 100,000 steel wheels. Diamond Chain Co., Inc., also is increasing capacity.

A 60,000-sq-ft headquarters and combination development-production plant is to be leased in northern Chicago by **Elgin National Watch Company** in September for the Micronics Division. The $1,000,000 plant will be equipped with special atmospheric controls to accommodate precision developmental and production work.

Jarvis Corp. of Middletown, Conn., announces the opening of two new one-story plants, both located in Connecticut. The Portland plant will handle specialized machining for the aircraft industry. The other is in Guilford.

Construction has started on a 289,000-sq-ft addition to the **General Motors** Detroit Diesel Engine Division plant. The new building will house all final assembly, testing, and shipping facilities for the division.

A $500,000 expansion in Allurtis, Pa., is in progress for **Loma Machine Mfg. Company.** It will provide a 50′ x 250′ machining bay, with 2,000 sq ft of additional shop space for auxiliary operations. The 26′ bay will be serviced by 10-ton overhead traveling cranes. New machinery to be installed in the extension includes boring, milling, turning, shearing, bending, and welding equipment.

with a

DI-ACRO ROD PARTER

Make several thousand burr-free cuts per hour in bar stock

Combination shearing-breaking action parts bar stock without burring and minimum distortion. Handles up to ⅜" round bar stock—square, rectangular, and hex shaped bar stock can be parted when machine is equipped with special die heads.

Material range is from hot rolled bar stock to stainless steel and other high alloy materials. The harder the material is the better it parts.

Long lasting die heads can be reversed before resharpening—can be sharpened many times. Standard cutting heads in No. 2 and power models have 10 graduated holes from 1/16" to ⅜"; No. 1 Model has eleven holes. Optional die heads for parting scaly hot rolled bar stock *at not extra charge.*

Speed-Matic Gauge, an accessory on power model, enables machine to part off several thousand short pieces an hour. *Send us samples for test cutting or consult the Yellow Pages of your phone book for the nearest Di-Acro distributor.*

This ½" stainless steel bar stock has been "parted" in a Di-Acro Rod Parter. Shiny edges show where rod was sheared, then fractured or "parted off." Will clear hole its own diameter.

Di-Acro Power Parter with stock stand and Speed-Matic Gauge.

Hand operated model also handles up to ¼" rods.

pronounced die-ack-ro

di-acro PRECISION METALWORKING MACHINES

O'NEIL-IRWIN MFG. CO.

315 8th Avenue, Lake City, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 24

NECROLOGY

William G. Huseby, assistant sales manager for Kearney & Trecker, died Dec. 28 at Milwaukee.

Dr. Willis R. Whitney, 89, founder of the General Electric Research Laboratory and honorary vice president of General Electric Company, died Jan. 3 in Schenectady.

Anton Reisman, 69, general superintendent of the Dependable Manufacturing Company, died Jan. 7 in Chicago, after an illness.

If you're spending this much . . . . . for lightweight tooling metals

. . . . . you can do the same job for this much with

DOW MAGNESIUM TOOLING PLATE

It's true! Dow magnesium tooling plate costs up to 35% less than other lightweight tooling metals. The fundamental characteristics of magnesium permit rolling and oven thermal flattening to a degree of flatness and surface smoothness satisfactory for virtually all tooling uses. This flatness is not obtainable in other lightweight tooling materials without costly machining of the surface.

You actually save money *twice* with magnesium because it costs less to fabricate, too. Magnesium is the most machinable of all tooling metals. It's easy to cut, to weld, and to handle in the shop, and lightweight magnesium tools make more efficient workers.

Investigate, and you will find that magnesium COSTS LESS TO BUY, COSTS LESS TO FABRICATE, COSTS LESS TO USE. Get the whole story from your Dow magnesium supplier. Contact him today or write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. MA 1428B.

AVAILABLE FROM STOCK AT:

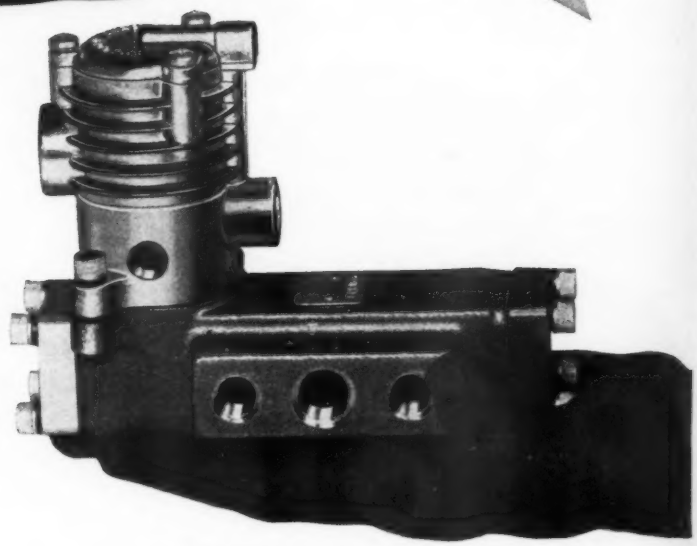
Copper and Brass Sales, Inc., Detroit, Michigan
Fullerton Steel and Wire Co., Chicago, Illinois
Hubbell Metals Inc., St. Louis, Missouri
A. R. Purdy Co., Inc., Lyndhurst, New Jersey
Reliance Magnesium Company, Los Angeles, California
Vinson Steel and Aluminum Co., Dallas, Texas

SEE THE DOW DISPLAY at the Philadelphia ASTE Show, May 1-8, Booth 1653.

YOU CAN DEPEND ON DOW

CIRCLE INFORM-A-GRAM KEY NO. 25

MODEL FD-120
$55.00
LIST PRICE
BASIC VALVE



MODEL F-120
$37.00
LIST PRICE
BASIC VALVE

op + lic = IPd + HPr

Outstanding performance plus low initial cost equals Increased Production plus Higher Profits! Apply this formula to your operations . . . use Valvair ¼ in. 4-way foot-mounted Speed King control valves. Whether you build or operate production machinery, you'll find that Speed King's compact size simplifies installation . . . instant-action response, 600 cpm speed and bubble-tight sealing assure accurate control . . . more productivity.

What's more, 20 million cycle-plus dependability and solenoid coils guaranteed against burn-out for the life of the valve keep maintenance and down-time at a minimum! Ask your Valvair representative to show you how ¼ in. Speed Kings can keep your costs down . . . your profits up! Valvair Corporation, 454 Morgan Avenue, Akron 11, Ohio. AA-6853

Find us fast in the 'Yellow Pages'

Compare . . . and you'll buy

Valvair

RESEARCH...
PROGRESS...
LEADERSHIP...

Representatives in principal cities

CIRCLE INFORM-A-GRAM KEY NO. 26

At Your SERVICE

Unique combinations of special equipment and welding, brazing, assembling, and quality control techniques for the fabrication of precision products, are available from The Griscom-Russell Co., Massillon, Ohio. The equipment is capable of manufacturing products that range in weight from several ounces to 60 tons.

•

Standard Tool Co., of Leomister, Mass., designs and manufactures molds for the plastics industry. Facilities include fabricating machines for plastics, injection molding machines, and general machine work.

•

Clauser Associates can be consulted on product development for the metalworking industry, automation, metal curtain wall design, and industrial building design. Electrical transmission and distribution system design for industrial plants is another service available.

•

Precision mold making, injection molding, and all secondary operations are services announced by V. H. Swenson Co., Inc., Arlington, N. J. Many types of injection molded nylon parts and products such as bearings, gears, bars, rings, flanges, etc. can be produced by this company.

•

Facilities for production of nuclear fuel elements and components are provided by D. E. Makepeace Co. These melting, fabricating, testing, and quality control facilities can also fabricate and clad rare and refractory metal parts for chemical, petroleum, electronic, and other applications. Operations include casting, forging, rolling, machining, and joining.

•

Up to 75% saving in tap cost through complete reconditioning is now possible through the services of the Pioneer Tool Crib, Inc. of Farmingdale, N. Y. This process combines grinding and finishing operations to put taps in operating condition. Other services include measuring pitch diameters and rebuilding to original size by hardchrome plating.

"The Tool & Die Makers Surface Grinder"

Harig's NEW

TML 6x12 SURFACE GRINDER

THE NEW TML BY HARIG PROVIDES EXTREMELY FAST AND ACCURATE GRINDING—STURDY CONSTRUCTION—ADVANCED DESIGN WITH ECONOMY IN MIND. . . *THE LOW COST WILL PLEASE YOU!*

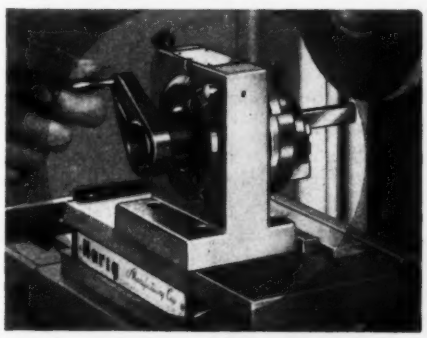
OUTSTANDING FEATURES

- Solid one piece construction of spindle housing and vertical slide.
- Elevating screw centrally mounted.
- Combination "V" and flat ways assure positive alignment.
- Angular rack and pinion mounting distributes wear equally along rack and pinion face.
- Motorized Spindle, dust collector and water unit available.

SPECIFICATIONS

Longitudinal Travel	12-3/8"
Cross Feed Travel	7"
Vertical Working Height (Under 7" dia. wheel)	0" to 12-3/4"
Platen Working Area	6" x 12"
Grinding Wheel	7" x 1/2" x 1-1/4"
Elevator Handwheel Graduation	.0005
Cross Feed Handwheel Graduation	.001

Remember: Harig's Famous Precision is in Evidence Throughout!



Harig's IMPROVED Grind-All FIXTURE

"The Latest Advancement in Perforator Grinding"

Fast, accurate perforator grinding fixture — hand crank for easy rotation of index plate, single locking screw for making quick set-ups. Easily grinds irregular shaped perforators concentric with shank within ±.0002 accuracy. Also can be used as milling, boring and inspection fixture. NEW! RADIUS DRESSER ARM—attachment makes Grind-All Fixture a highly accurate radius dresser.

made by the house that precision built!

Harig Manufacturing Corp

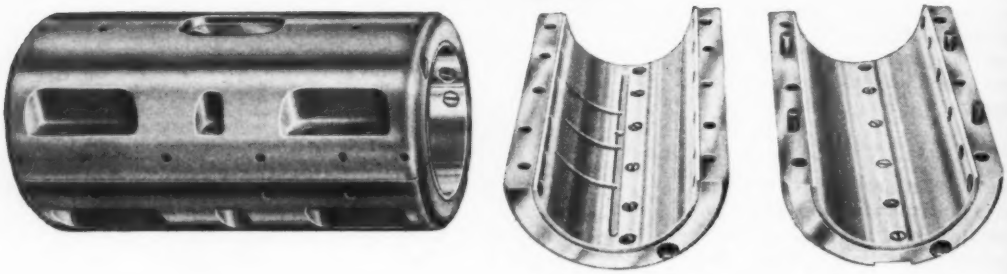
5761 W. Howard St. - Chicago 31, Ill.

"See Us At Booth 1027 A.S.T.E. Show"

CIRCLE INFORM-A-GRAM KEY NO. 27

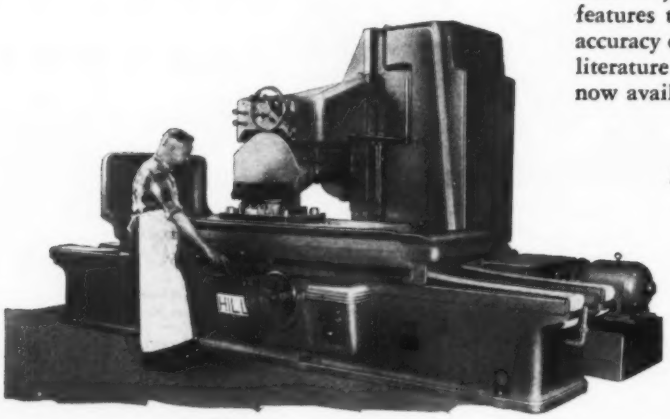
Novel Design provides *Astonishing Bearing Life*

The life of the HILL front spindle bearing on HILL horizontal spindle hydraulic surface grinders is truly astonishing. This bearing has been an *exclusive* HILL feature for more than 15 years. The necessity of replacement, under constant use, is practically unknown.



The front spindle bearing on HILL horizontal spindle hydraulic surface grinders was engineered by the HILL ACME COMPANY and has proven in the field to operate indefinitely. An alloy bronze bushing is fastened to a semi-steel casting with brass screws. The bronze bushing is undercut lengthwise in four equidistant locations on the outside diameter to allow for spindle expansion. (Darker areas in photo show undercut sections.) A perfect bearing surface is established in the I.D. of the bronze directly opposite the undercut sections. Oil is forced into specially designed concave relief areas which act as oil wedges assuring long bearing life. Hardened dowel pins guide the two halves together to their original position. The bottom half of the bearing has an oil return slot shown at the edge of the half section on the outside diameter. Note that there are NO oil grooves in this bottom half or in the quarter half of the top section. The shaft rotation spreads the oil film from the oil distribution grooves to the perfect bearing surfaces. Any additional oil grooves would act as scrapers and be detrimental to the oil film formed around the spindle.

This is just one of the many exclusive construction features that result in the longer life and permanent accuracy of HILL heavy duty surface grinders. Detailed literature on these high-precision machine tools is now available.



24" x 24" x 72" HILL horizontal spindle surface grinder grinding blanking dies to extremely close tolerances. Also built in Vertical Spindle design.

THE HILL ACME COMPANY

HILL DIVISION . . . . . ESTABLISHED 1882

1201 West 65th Street • Cleveland 2, Ohio

HILL ACME TOOLS FOR INDUSTRY

"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALL MANUFACTURERS OF "ACME" FORGING • THREADING • TAPPING MACHINES • "CLEVELAND" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES

CIRCLE INFORM-A-GRAM KEY NO. 28

Why the Die Maker Prefers PRODUCTO Die Sets

Volkert Stampings, Inc.

The die maker likes to work with Producto Die Sets

He knows Producto die sets are easy to assemble —especially those equipped with the unique new Qwik-Fit Guide Pins*.

He has confidence in the consistent accuracy of Producto sets. He has found that they always align his dies correctly.

He knows he can choose from a variety of thicknesses the Producto die set that meets the strength requirements of his die.

He favors Producto die sets because they are dependable. They will perform on the press as well as they did in tryout.

He likes the attractive, streamlined appearance of Producto sets. They make his dies look better and increase his pride in these products of his craftsmanship.

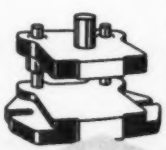
*Patent Pending

He knows that a nearby Producto warehouse can supply any catalog die set he needs...and that orders for specials are promptly processed. He can count on having the die set by the time he needs it.

The die maker has found that all of his requirements are met by Producto die sets. You will, too, when you place your order with Producto.

DIE SET DIGEST, our eight-page quarterly, contains valuable data for designers, makers and users of dies. Write to have your name added to mailing list.

THE PRODUCTO MACHINE COMPANY
970 Housatonic Ave., Bridgeport 1, Connecticut



PRODUCTO

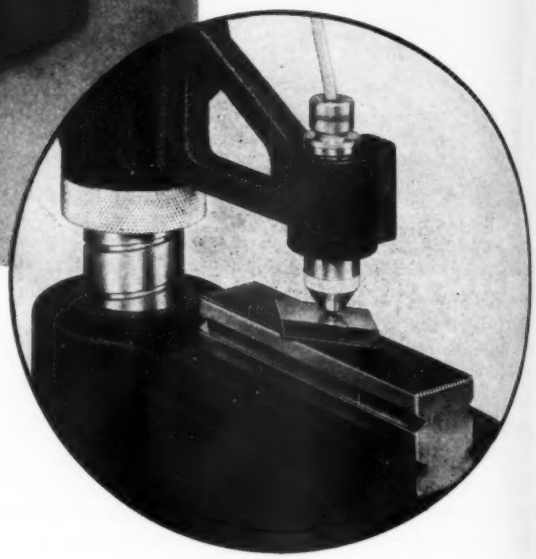
Wherever die sets are used

PRODUCTO

PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

CIRCLE INFORM-A-GRAM KEY NO. 29

NOW! ON-THE-JOB GAGING with ACCURACY TO .00002"



THREADWELL DUAL RANGE S. I. ELECTRONIC COMPARATOR

New portable unit for on-the-job gaging and comparing now available from Threadwell at an amazing low price. Only the Threadwell S.I. Electronic Comparator has all these features:

- Two ranges selected by a simple turn of the control knob
- Coarse range 200:1, fine range 2000:1
- Lifetime steel tipped gaging unit
- Perfect repetition not found in units costing much more
- Operating pressure of less than 3 ounces
- Work is slid under the gaging head tip
- No sensitivity to temperature change; allows use in any part of plant or shop
- Interchangeable tips for various applications
- Flexible zero adjustment on the most sensitive range. Gaging head can be set up in a simple split clamp without need for fine mechanical adjustment.

Threadwell

THREADWELL TAP & DIE COMPANY
Greenfield, Mass., U.S.A.

Write now for complete information on this amazing instrument or see your Threadwell Distributor.

CIRCLE INFORM-A-GRAM KEY NO. 30

BETTER CARS ARE BEING BUILT

New

Henry & Wright Double-Crank Dieing Machines Produce More Parts Faster . . . More Accurately

150 ton Henry & Wright, one of ten installed by a leading automobile manufacturer in the Flint area.

Die operations on a hood bumper bracket. After the neck of the part has been freed, the work is advanced by a single tab and a carrier strip.

Stamped parts of today's cars must be produced rapidly and in quantity, but they must also be held to close tolerances of accuracy. Henry & Wright machines are now offered in a new double-crank design. The crosshead is supported on both sides of the die so that the tools close in perfect alignment even with severe off-center loads. Thus, parts are more accurate and uniform . . . die life is greatly extended. Because machine design permits quick and easy die change, non-productive time is reduced to a minimum.

Handling more jobs—faster—and to required accuracy tolerances—makes the H & W machines an integral part of automation processes for any plant. These machines are truly the result of "pooled ideas" from the automotive field and from experienced H & W engineers.

Send today, for complete information on these new and proven production profit makers. Build your new production around Henry & Wrights—they're made by H-P-M, you know, a leader in metalworking processes since 1877.

H-804

THE HYDRAULIC PRESS MFG. COMPANY

A DIVISION OF KOEHRING COMPANY • MOUNT GILEAD, OHIO, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 31

ALL THE **PRODUCTION** YOU'LL *EVER* WANT—

ALL THE **PRECISION** YOU'LL *EVER* NEED

RIGIDITY and STAMINA TOO!

Generates spur gears, spiral gears, bevel gears, face gears, worm gears, worms, spline shafts, gear sectors and pinions. 12 hob speeds, from 109 to 1259 R.P.M. Helix leads from .800" to 130". Generates gears with as few as 3, or as many as 650 teeth. Speed, feed, and indexing, each can be selected independently. Capacity from .050" to 6" O.D. of gear blank depending on gear characteristics. Free Bulletin No. 2544 provides full information.

2544

It's the

Hamilton

PRECISION SMALL-GEAR HOBBING MACHINE

THE HAMILTON TOOL COMPANY • 832 SOUTH NINTH STREET • HAMILTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 32

PAID OFF in 13 weeks

JOB: Smoothing edge of plate after flame-cutting. Grinding time with tool formerly used—*2 hours.* Rotor Application Engineer recommended the *right tool*—a Rotor B-7SS* Vertical Grinder and Sander.

RESULT: Grinding time now 1½ hours—a savings of $20.25 per 40-hour week. Fast, light (6¾ lbs.) Rotor B-7 gives better finish, reduces operator fatigue.

ASK FOR DEMONSTRATION of this lightweight, power-packed grinder or other Rotor Tools for *your* jobs. Write for Bulletin 56 on Vertical Grinders. The ROTOR TOOL Company, Cleveland 32, Ohio.

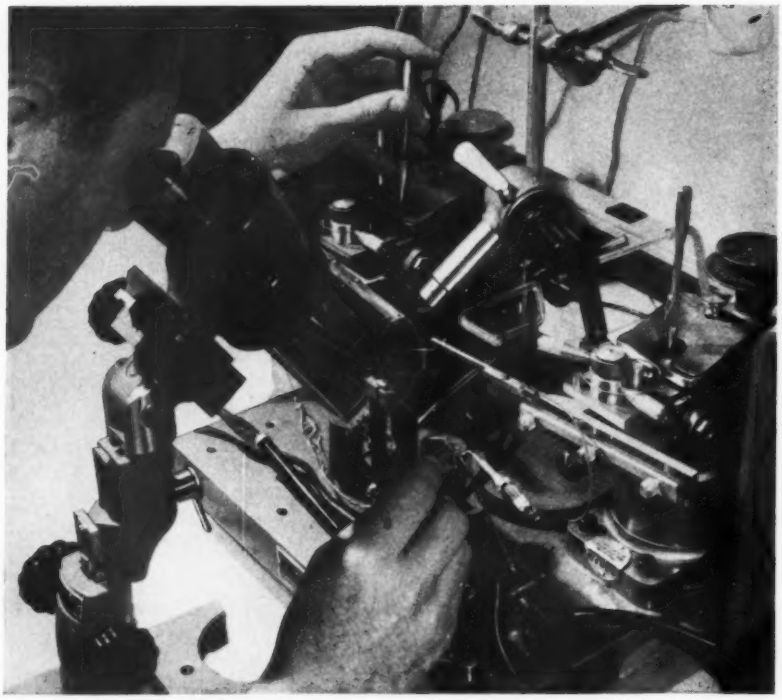
*B-7 with Safety Snap Throttle Handle

Here's the RIGHT TOOL for YOUR job!

Rotor Air Tools: Assembly Tools • Drills • Small Wheel Grinders
Straight Grinders • Vertical Grinders • Scalers • Chippers • Rammers
Rotor High-Cycle Electric Tools: Grinders • Polishers • Sanders

ROTOR TOOLS
CLEVELAND, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 33



3-D MICRO-VISION helps RAYTHEON develop new SPACISTOR amplifier

Spacistor shown next to ordinary pinhead.

The Spacistor, Raytheon's new semiconductor amplifier, opens new horizons in missile and communications equipment design. Still in development, the Spacistor promises to combine many advantages of transistors and vacuum tubes.

Viewed through a Bausch & Lomb Stereomicroscope, contact points that are normally barely visible can be positioned with hairline accuracy. 3-D magnification shows all parts vividly, right side up. Long working distance permits free movement of hands and tools between eyepiece and stage. Dustproof, shockproof optical system, with sharp, flat images free from distortion, assures fatigue-free viewing throughout prolonged examination.

SEE FOR YOURSELF! MAIL COUPON FOR FREE 15-DAY TRIAL

BAUSCH & LOMB

BAUSCH & LOMB OPTICAL CO.
79827 ST. PAUL ST., ROCHESTER 2, N. Y.

☐ I'd like to borrow a B&L Stereomicroscope for a 15-day trial without cost or obligation.

☐ Send me B&L 3-D Micro-Vision Book (Cat. D-15), containing valuable data, showing actual stereo views.

NAME .....
TITLE .....
COMPANY .....
ADDRESS .....
CITY ..... ZONE ..... STATE .....

CIRCLE INFORM-A-GRAM KEY NO. 34

Presenting . . . Representing . . .

Now representing Detroit Tap & Tool Co. are the R. Van Alstyne Tool Co. of Schenectady, N. Y., northeastern New York area: J. Ray Uber, of Monroeville, Pa., western Pennsylvania, eastern Ohio, northern West Virginia, and western Maryland; and Robert N. Kendall, of Milwaukee will serve in that area.

•

General Refrigeration of Kitchener, Ontario has been appointed sales representative for Cincinnati Sub-Zero Products.

•

Whitney Tool & Supply Co. of Hartford, Conn., will serve as distributor for Electro Refractories & Abrasives Corp. in Connecticut.

•

The appointment of Machinery Associates, Inc. as a distributor for Danly Machine Specialties, Inc. has been announced. The company will serve eastern Pennsylvania, southern New Jersey, Delaware, Maryland, and District of Columbia, from Wynnewood, Pa.

•

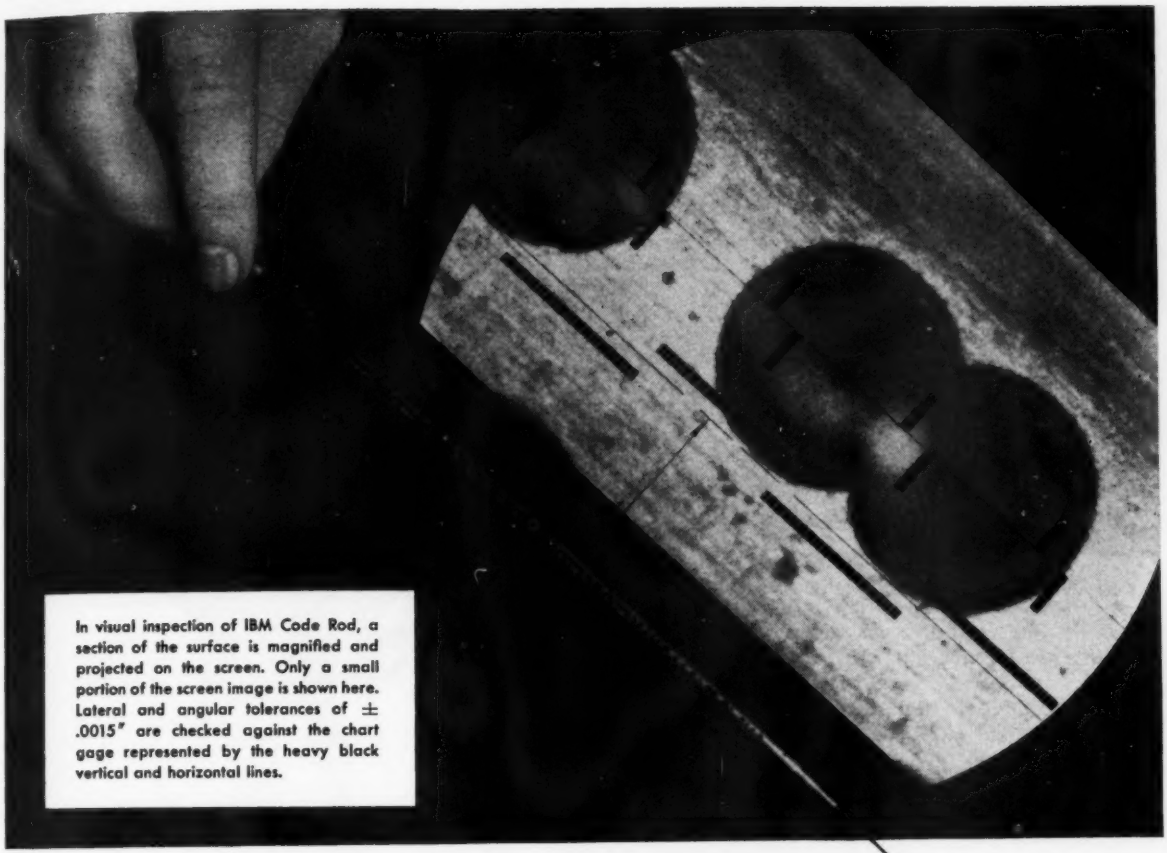
The Thompson Grinder Co. has appointed the Southeast Machinery Co. of Ft. Lauderdale, Fla., distributor for Thompson grinders in Florida. The north Texas representative is Machine Tool Associates, Inc. of Dallas.

•

J. Lee Hackett Co. of Detroit has been appointed sales and service representative in Michigan by Mattison Machine Works. It will represent the complete line of grinding machines.

•

R. J. R. Kelley Co. of East Orange N. J., is representing the line of power bench type punch presses and accessories for The Alva Allen Industries. The territory includes New York, New Jersey, Pennsylvania, Maryland, Delaware, Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, and the District of Columbia. Paul Watts Inc. of San Francisco will represent the company in California, Oregon, Washington, and the western half of Nevada. Indiana, Kentucky, Ohio, Michigan, and West Virginia will be represented by Hazerodt Associates of Royal Oak, Mich.



In visual inspection of IBM Code Rod, a section of the surface is magnified and projected on the screen. Only a small portion of the screen image is shown here. Lateral and angular tolerances of ± .0015" are checked against the chart gage represented by the heavy black vertical and horizontal lines.

How would you gage these 1,118 holes?

Here's how IBM did it... and smashed an inspection bottleneck

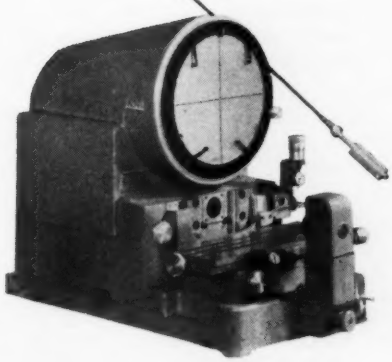
Here's how International Business Machines Corporation boosted the inspection rate on its new Code Rod from 1 or 2 *per day* to 15-20 *per shift*—keeping pace with production, yet maintaining complete accuracy—with a Kodak Contour Projector, Model 14-2A.

The Code Rod is used with the new 720 High Speed Wire Printer, developed by IBM to overcome the speed limitations of conventional bar type printers. The rod is a stainless steel tube with no less than 1,118 1/32" holes. The holes are drilled in various combinations at 7 different intervals in 7 straight rows down the 8" length of the tube. Obviously the inspection problem is of no small proportions.

Lateral and angular tolerances for the holes are ± .0015". *To maintain these tolerances is critical because any mis-drilled holes would cause an error in the shape of the characters to be printed.* What's more, the 720 Printer operates at extremely high speeds, and any slight error could affect its operation.

In visual inspection a master Code Rod is placed next to the rod to be inspected. Both surface images are projected on the screen. The operator simply indexes the image along simultaneously, so that he always has a correct rod in view for comparison of the hole grouping. He checks tolerances by a chart gage on the projector screen.

Got an inspection bottleneck at your plant? Optical gaging with a Kodak Contour Projector may well be the answer. The booklet "Kodak Contour Projectors" gives examples of how other firms are profitably using Kodak Contour Projectors, plus full data on the various models we offer. The booklet is available on request from:



Kodak Contour Projector, Model 14-2A, is a versatile precision measuring instrument for production lines or toolroom. It is one of 6 Kodak Contour Projector models available to meet all your optical gaging needs. Operators work in complete comfort, need little training.

Apparatus and Optical Division

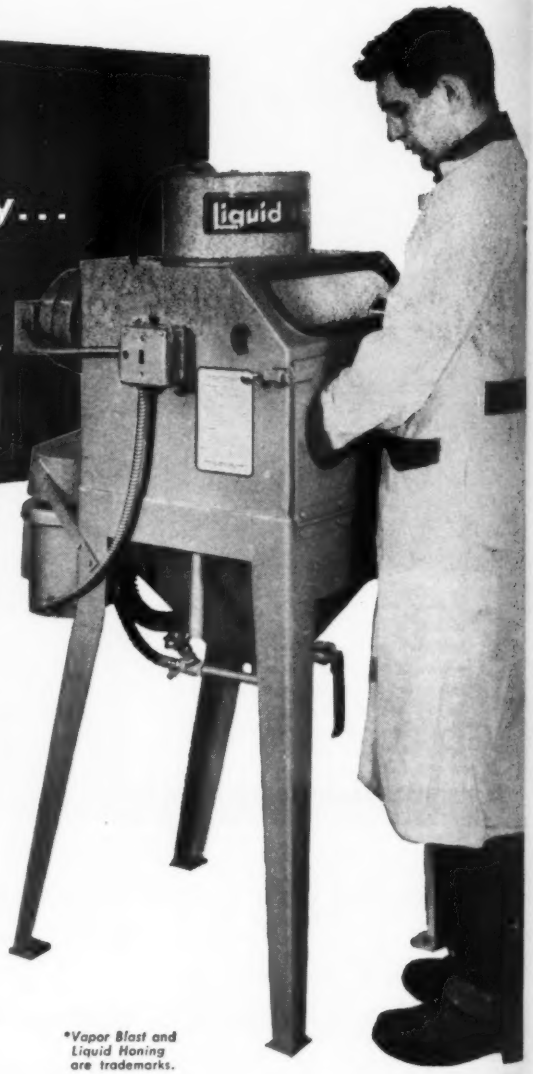
EASTMAN KODAK COMPANY, Rochester 4, N. Y.

the KODAK CONTOUR PROJECTOR

Kodak

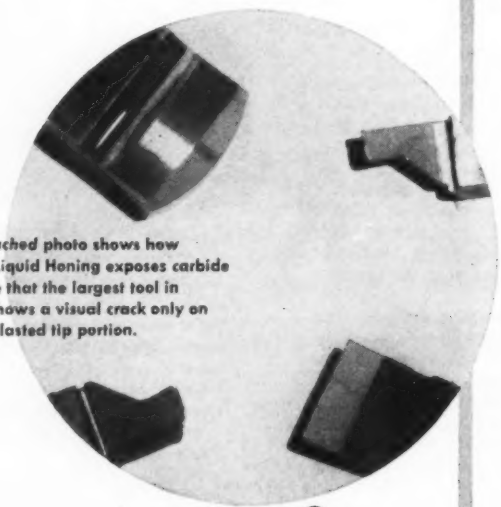
CIRCLE INFORM-A-GRAM KEY NO. 35

Detect Carbide Cracks Quickly, Positively... with V-B Liquid Honing*



Now you can prevent profit losses traceable to new or reground carbide tools that break because of cracks, porosity and other imperfections. Liquid-abrasive action flushes out the fine sintered material which, under grinding heat and pressure, often seals minute cracks and prevents detection by other methods. After Liquid Honing, fissures and other defects become *visually apparent* in a satin matte finish that remains dimensionally the same as the previous finish. Liquid Honing inspection processing is fast and thorough — more than 100 single-point tools per hour. And those tools, if not defective, last longer and cut better because they're free of burrs.

*Vapor Blast and Liquid Honing are trademarks.



This unretouched photo shows how effectively Liquid Honing exposes carbide cracks. Note that the largest tool in the group shows a visual crack only on the Vapor Blasted tip portion.

A Liquid Honing machine for carbide crack detection serves you in many other ways. Use it for surface conditioning, finishing, cleaning or descaling — often at production savings of 65% to 80%!

Write for complete information on case histories and low cost — only $550 to $1500 for a standard machine. And send a sample tool or part for free demonstration processing.

VAPOR V-B BLAST MILWAUKEE WISCONSIN

VAPOR BLAST MFG. CO.
3131 W. Atkinson Ave. • Milwaukee 16, Wis.

CIRCLE INFORM-A-GRAM KEY NO. 36

WHAT'S NEW IN PLASTICS?

"Vacuum and Drape Forming Machines" is the title of a bulletin from Emhart Mfg. Co., 760 Windsor St., Hartford, Conn. Vacform equipment combines both vacuum and drape forming processes in one machine. Features and specifications of the machines are described and illustrated, and typical applications are included. For your copy of the bulletin write to the company, or —
Circle Inform-A-Gram No. E1.

Uniform Drying and Preheating of Material are features of the hopper-dryer and automatic jet loader for all ejection and extrusion machines, explained in a bulletin. Faster extrusion and injection rates are possible because the material is perfectly conditioned. Features and specifications are included in the bulletin. Copies are available from Thoreson-McCosh, Inc., 18208 W. McNichols Rd., Detroit 19, or—
Circle Inform-A-Gram No. E2.

150,000 Stampings Per Run are possible where low gage softer metals are to be formed, using the improved tooling method, Epoxy-Alloy. Other advantages of this plastic tooling material include the possibility of mass casting the tools and dies, substantially increased thermal conductivity, and greater rigidity and impact strength. Applications and specifications are included in the bulletin from Bakelite Co., Div'n of Union Carbide Corp., 260 Madison Ave., New York 16.
Circle Inform-A-Gram No. E3.

Production Joining of Metals, plastics, ceramics, and other materials can be accomplished with Epoxweld 100 preforms, described in a bulletin. Information on the melting point, curing temperatures and cycles, and clearances required, is presented. Typical applications include bonding metal parts to all types of ceramics, glass, etc.; bonding tough-to-solder materials; and hermetic sealing of electronic components. Bulletin 114 is available from Duramic Products, Inc., 262-72 Mott St., New York 12, N.Y., or—
Circle Inform-A-Gram No. E4.

. . . *Continued on page 41*

SUPREME PRODUCTS CORPORATION
2222 S. Calumet Ave., Chicago 16, U.S.A.
A DIVISION OF A•S•R PRODUCTS CORPORATION

CIRCLE INFORM-A-GRAM KEY NO. 37

MANUFACTURING MEMOS

CORPORATION FORMED . . .

● A new corporation, Engelhard Industries, Inc., was formed by a consolidation of nine American companies in the precious metals and precision manufacturing fields. These include D. E. Makepeace Co., National Electric Instrument Co., The H. A. Wilson Co., and Charles Engelhard, Inc., now divisions of Engelhard Industries, Inc.

FINANCING PLAN . . .

● New Britain Machine Co. has announced the establishment of a long-term financing plan for the purchase of machine tools. The plan, made with the cooperation of C.I.T. Corp., features terms to 10 years and downpayment requirements as low as 10%.

MERGER . . .

● The latest expansion of the Circon Component Corp. of Santa Barbara is the acquisition of the majority of the Griffith Bros. Co., which will be known as the Griffith-Circon Corp. These facilities will manufacture Circon precision instrument screws and related and connector parts, and will do custom screw machine work.

NAME CHANGES . . .

● Duramic Products, Inc. is the new name of Technion Design & Mfg. Co., Inc.

● F. E. Anderson Oil Co., Inc. of Portland, Conn., is now known as the Anderson Oil and Chemical Co., Inc.

● LeMaire Tool & Mfg. Co., has changed its name to LeMaire Machine Tool Co.

NEW WAREHOUSE . . .

● A warehouse has been established in the Los Angeles area for the distribution of the line of solid and hollow tool and die steels made by A. Milne & Co., Inc.

NEW LINE . . .

● E. W. Bliss Co. has announced that a multi-fingered vise has been added to its product line. The vise, acquired from the American Positive Grip Vise Corp., will be sold under its former name, Ampogrip.

● Ed. Castor Associates will produce and distribute nationally the EDCO line of high speed and carbide metal cutting tools. Edwin Castor is president and Frank Wilson serves as general manager.

DIVISION FORMED . . .

● The Carborundum Co. announces that the Stupakoff Division, Globar Division, and Refractories Division will be integrated into one division, named the Refractories Division. All personnel, plants, and activities, except the Stupalox sintered oxide cutting tool project, will be combined in the new division.

The acquisition of full ownership of Rem-Cru Titanium, Inc., from Remington Arms Co., by Crucible Steel Company of America, was announced recently.

◆

A new section of Bendix Aviation Corp. has been established to engineer, manufacture, and sell tape-controlled production systems, including equipment that will use blueprint measurements to produce a finished part.

◆

The Double A Products Co. of Manchester, Mich., has joined forces with the Brown & Sharpe Mfg. Co. of Providence, as a wholly-owned subsidiary. This will enable technical cooperation toward creation of new and broader hydraulic product lines.

◆

Zagar, Inc. has opened a Detroit office in Royal Oak, Mich., with Jack T. Meyer as district manager.

◆

William K. Creson, consulting engineer of Ross Gear and Tool Co., Inc., has been elected president of the Society of Automotive Engineers for 1958.

◆

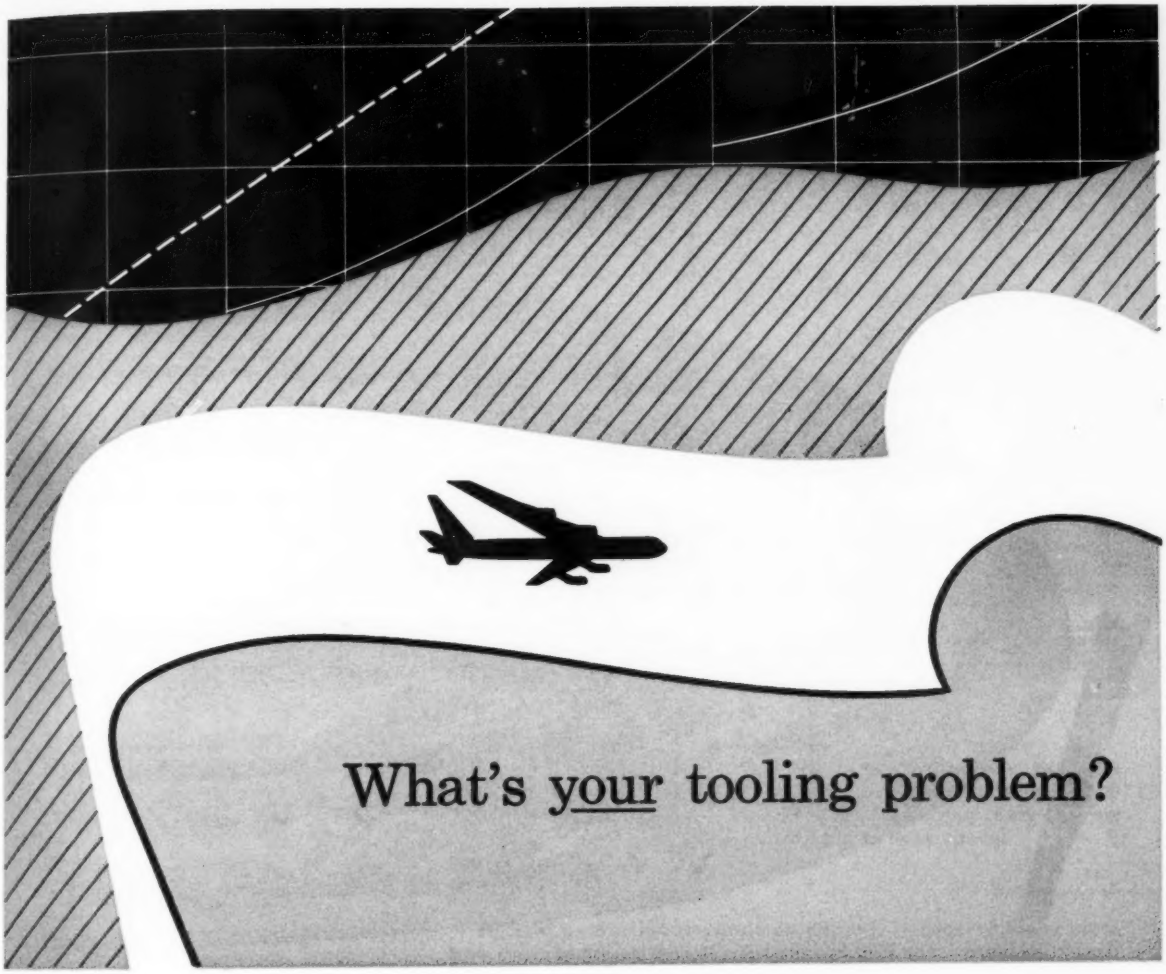
The Ramo-Wooldridge Corp. and Thompson Products, Inc. have formed a new subsidiary corporation, known as Thompson-Ramo-Wooldridge Products, Inc. The company will specialize in industrial process control, and will market as its first major product, the RW-300 digital control computer.

◆

Howard Industries, Inc. has purchased the Universal Motor Division of Westinghouse Electric Corp. in Lima, Ohio. Machinery and equipment from Universal is being moved to the Howard plant and will be installed in a 35,000 sq. ft. addition.

◆

Mercast Corp. has announced the acquisition of Gray & Huleguard, Inc., Los Angeles. Plans for Gray & Huleguard include stepping up the company's capacity to design and supply the special equipment needed for missiles and aircraft programs.



Your tooling resin formulator can help you with EPON® RESIN

The skill and knowledge of your tooling resin formulator combined with Shell Chemical's years of experience and technical research mean more profitable production for *you* with Epon resin tooling.

In addition to supplying basic tooling information, Shell Chemical also has developed extensive data on fillers, flexibilizers, curing agents, and diluents for your tooling resin formulator.

In many fields of industry, the unusual physical properties of tools made with Epon resin-based formulations make possible the saving of more than half the cost of fabricating a conventional tool.

High temperature tooling. Both metal and plastic forming tools, capable of operating at temperatures between 400°F. and 500°F., can be made with Epon 1310.

Long-lasting metal forming tools. Test results show that a casting of an Epon resin formulation mounted in a crank press and subjected to repeated blows had no permanent deformation after 28,000 cycles.

Excellent tolerances. Little machining and handwork are required to finish Epon resin tools, because the material can be fabricated to very close tolerances.

Outstanding strength. Tools with thin cross sections can be laminated with layers of glass cloth and Epon resin to achieve high flexural strength.

Can Epon resin help you with your tooling? Find out now by writing your tooling resin formulator. For a list of tooling resin formulators, write to Shell Chemical.

SHELL CHEMICAL CORPORATION

CHEMICAL SALES DIVISION

Atlanta • Boston • Chicago • Cleveland • Detroit • Houston • Los Angeles • Newark • New York • San Francisco • St. Louis

IN CANADA: Chemical Division, Shell Oil Company of Canada, Limited, Montreal • Toronto • Vancouver

SHELL

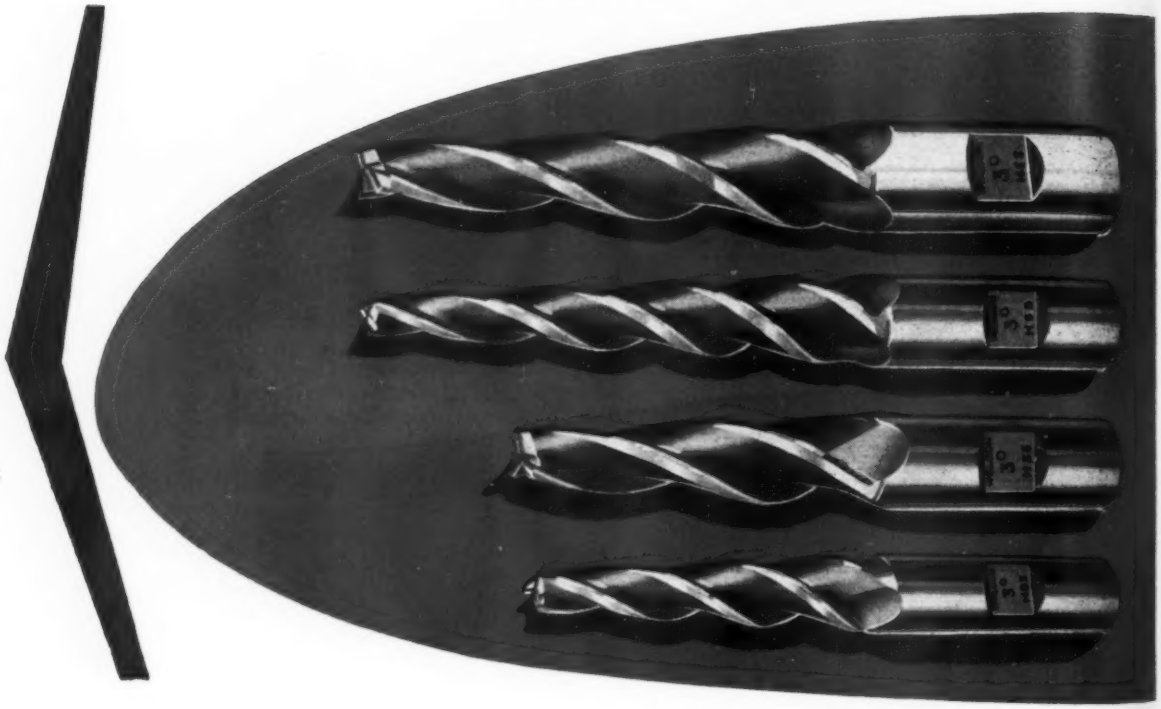
CIRCLE INFORM-A-GRAM KEY NO. 39

YESTERDAY'S PIONEER . . . TODAY'S LEADER

WELDON / TAPERED END MILLS

DIE SINKING CUTTERS

CONSTANT SPIRAL FLUTES



• The extensive line of the well known Weldon End Mills includes Tapered End Mills, Constant Spiral. Also known as Die Sinking Cutters, these end mills, filling a definite need, come in a wide range of sizes, giving a choice of many lengths and diameters.

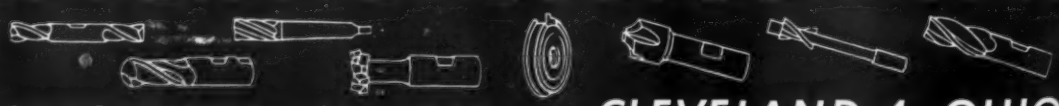
Weldon Tapered End Mills as standard stock items are all 3-flute, and offer a choice of ½°, 1°, 1½°, 2°, 3°, 5°, and 7° angles, taper on side. They represent the same high quality for which all Weldon End Mills are famous.

WRITE FOR CIRCULAR

40 YEARS OF LEADERSHIP 1918—1958

Weldon distributors throughout U. S. A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY



3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 40

. . . Plastics from Page 37

Industrial Tooling Resins Called Ecobild are described in a bulletin published by Emerson & Cuming, Inc., 869 Washington St., Canton, Mass. It's easy to use, lightweight, and stable at high temperatures. An automatic mixing and dispensing machine for large scale repetitive use of these resins is also described. For your copy of "Plastics for Tooling," write to the company, or—**Circle Inform-A-Gram No. E5.**

Polytool Clear Epoxy Resins, available in high, medium, and low viscosities, are discussed in a technical bulletin which gives the properties. A chart listing the field of applications is also included. Write to Reichold Chemicals, Inc., RCI Bldg., White Plains, N.Y., for a copy of the bulletin.
Circle Inform-A-Gram No. E6.

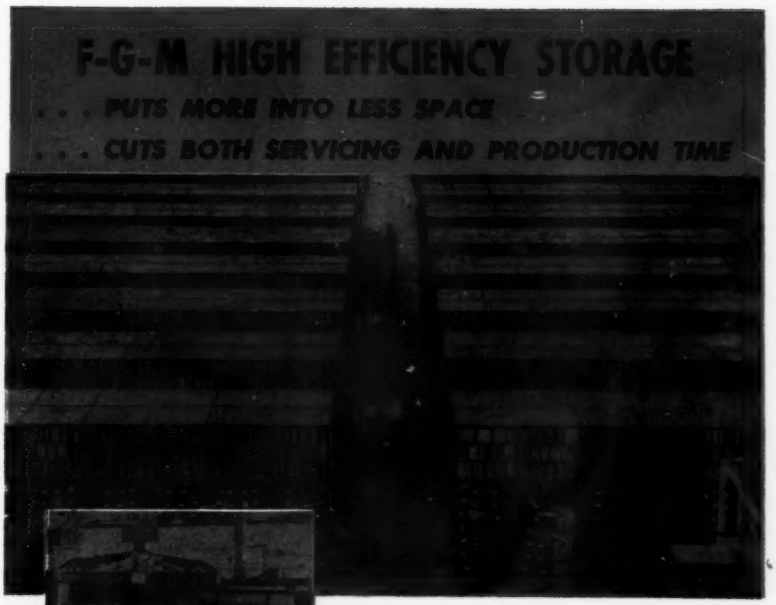
ARBOR IS CHANGED RAPIDLY BY SPINDLE NOSE DEVICE

A quick change arbor arrangement for milling machines, known as Arbor Loc, has been developed by the Cincinnati Milling Machine Company.

Special purpose changing accessories are not required, and switching a tool involves five easy steps: Loosen adapter ring with a spanner, remove old arbor, insert new arbor, snug-up ring by hand, tighten ring.

This spindle nose device can be completely dismantled rapidly when face milling cutters are called for, and a conventional draw-in bolt is supplied for tooling setups that need it.

It accommodates Cincinnati's line of No. 50 series arbors and adapters, and is incorporated in many of their knee-and-column machines at no extra cost.



This F-G-M planned storeroom saves time and space for an aircraft manufacturer.

Used on the production line, Rotabins make large quantities of supplies instantly available from only a few square feet of floor space.

Efficient production depends on efficient storage of tools, parts and subassemblies. F-G-M experienced and specialized service in this field can assure you of minimum use of floor space, minimum servicing time, minimum production delays.

Rotabin systems are adaptable to either numerical sequence, providing large rectangular spaces adjacent to smaller, efficient Rotabin compartments, or to card location methods.

F-G-M Planning Service is yours for the asking.

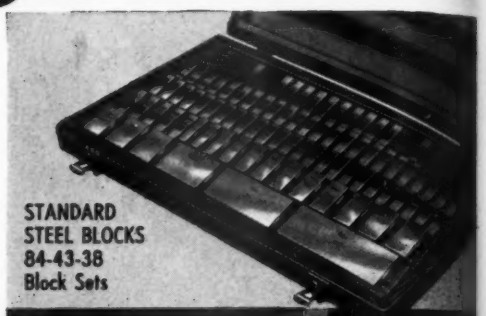
Write today for your free copy of "The Science of Economical Storage." The Frick-Gallagher Mfg. Co., 106 S. Michigan Avenue, Wellston, Ohio.

CIRCLE INFORM-A-GRAM NO. 41

Webber Gage Blocks

Insure the Accuracy Essential To Mass Precision Production

Making Webber Gage Blocks is a science—a combination of human skill and the world's finest mechanical and laboratory equipment, both highly specialized. Only with such a combination can gage blocks be made to meet the high standards which Webber steadfastly maintains. Webber can fill your every gage block need, with the most complete line of gage blocks and related accessories.



STANDARD STEEL BLOCKS
84-43-38 Block Sets

"THIN BLOCK" Gage Set
30 Blocks

SQUARE
Gage Blocks
In Standard Steel and
CROBLOX (solid chrome carbide)

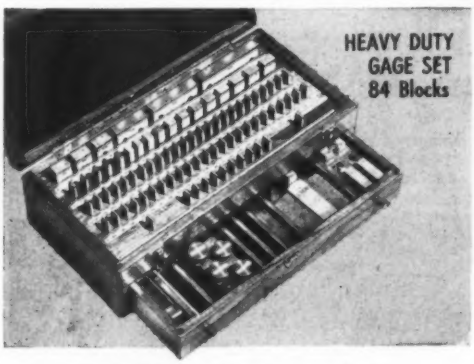
In 88, 85, 84, 81, 36, and 34 Block Sets
Accuracies, both steel and Croblox, "B" +.000006 −.000002 "A" +.000004 −.000002
Illustrated — Set No. 88A with Accessories

THE NEW
WEBBER
OPTICAL
HEIGHT GAGE

Micro Accurate Vertical Measurements up to 61 inches.

"CROBLOX" GAGE SETS

Solid Chrome Carbide
82, 33, 36 and
14 Block Sets



HEAVY DUTY
GAGE SET
84 Blocks

ANGLE GAGE BLOCKS
Two types—"Laboratory Master" and standard steel. ¼ second and 1 second accuracy.

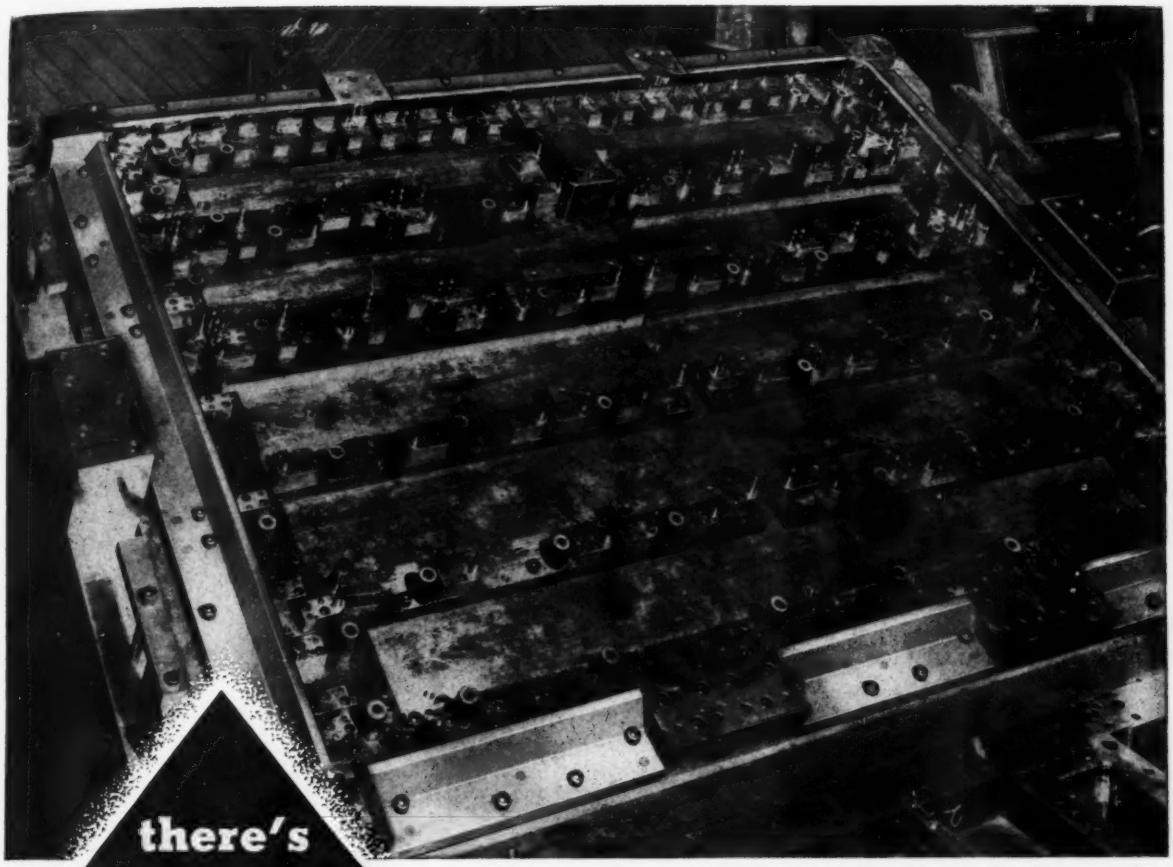
WEBBER ACCESSORIES—permit using gage blocks directly as snap or ring gages, scribers, and with a base block, as a height gage.

WEBBER TEMP-CHECK
Essential wherever accurate control of temperatures is a must. Measures liquids, gases or solids. 4 Models.

Webber GAGE COMPANY
12903 Triskett Rd. • Cleveland 11, O.

LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS

CIRCLE INFORM-A-GRAM KEY NO. 42

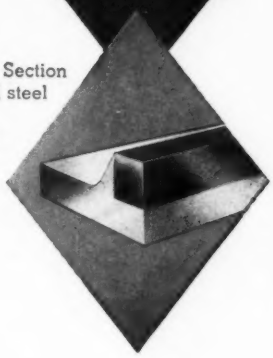


Photograph courtesy of the Ready Machine Tool & Die Company, Inc., Connersville, Ind. shows Ohio Knife Co. Composite Die Sections on a blank and pierce die for a 4' x 6' refrigerator inner food compartment.

there's a NEW way to build your dies

it saves you time and money

OK Die Section shows tool steel clad to mild steel backing.



You simply order from our large stock of Composite Die Sections. They are cut to your required length or in bars 125" long. There are eleven standard cross sections with both wide and narrow lands available.

You buy them at a price far below what it's costing you to make them yourself.

You receive them with cutting or forming edge already hardened, machined and ground. The soft steel backing, to which our specially hardened tool steel is clad, can be drilled quickly and economically for dowel and screw holes. Adjustments for wear are equally simple.

Hundreds of companies who have switched to OK Composite Die Sections available for Cutting, Trimming and Forming Dies, report great time and money savings, plus longer die life. For new bulletin on OK Composite Die Sections and Clad Aluminum Bronze Wear Plates, write Dept. 47-AE.

Manufacturers for the Metal Working Industry of:

Composite Die Sections . Bronze Ways . Wear Strips
Shear Blades . Slitter Knives . Work-Rest Blades
Cut-off Blades . Hardened Ways . Hardened Spacers

THE OHIO KNIFE CO.

CINCINNATI 23, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 43

MEN YOU SHOULD KNOW

Appointment of **J. V. McGuire** as assistant general manager of its Pittsburgh Works has been announced by Allis Chalmers Mfg. Co. McGuire, former manager of the switchgear department, is succeeded in that post by **D. W. Webb. H. P. Pinkham** is assistant general manager of the Boston Works, and **E. R. Danielson** is assistant to **W. M. Wallace,** vice president and general manager of the General Products Division.

◆

Ajax Electric Co. has made known the election of **Leon B. Rosseau** as president and treasurer, succeeding **John E. Haig** who will continue to serve Ajax on a consulting basis. Production manager **H. W. Schrader** was elected vice president, and comptroller **B. R. Russell** became secretary.

◆

Appointment of **E. V. Collins** as plant engineer has been announced by the U. S. Metal Coatings Co., Inc.

◆

Harold F. Hildreth has taken over as president and general manager of The O. A. Sutton Corp., Inc., and will also serve as a member of the board of directors.

◆

John J. Morrissey has been named general manager of General Drop Forge Corp., a wholly-owned subsidiary of Dana Corp.

◆

Edward E. Kirkham, project engineer at the Pratt & Whitney Co., has been named chief development engineer and head of the experimental department of the company's machinery division. He has been identified closely with Pratt & Whitney's development and perfection of numerically controlled machine tools.

◆

Antoni Niedzwiedzki has been appointed a machinability engineer for General Electric's Metallurgical Products Department in Detroit. **Robert A. Slater** serves as manager of manufacturing engineering for the department.

◆

New vice presidents of the Minnesota Rubber Co. include **Robert R. Johnson,** engineering; **E. Burke Neff,** quality and cost control; **Loren J. Sewall,** manufacturing; and **Richard G. Wells,** director of sales.

New assistant chief engineer of the Plymouth Division, Chrysler Corp., is **George D. Cowie.**

◆

New director of technical development of the Diamond Drilling Division of The Wheel Trueing Tool Co., is **A. F. Pickard.**

◆

Appointment of **O. B. Schier, II** as secretary of The American Society of Mechanical Engineers, has been announced.

◆

Specialty Products Department of Airborne Instruments Laboratory, Inc. has announced the promotion of **Lawrence J. Torn** to the position of chief engineer. This assignment calls for coordination of the company's production design activities in the field of industrial control systems, involving automatic machine and process controls and electronic test equipment.

◆

William R. Johnson has been appointed chief research metallurgist, and **Richard J. McCluskey** has been named chief machine design and development engineer, at Associated Spring Corporation's research center in Bristol, Conn. **H. Perry Smith** succeeds **Franz P. Zimmerli** as director of research.

◆

Promotion of **Walter Kudlaty** to chief design engineer for the Miller Fluid Power and Tru-Seal Divisions of the Flick-Reedy Corp., has been made known. **James Schaeffer** is now assistant to the production manager of the Miller Fluid Power Division.

◆

The appointment of **James E. Paumier** to the new position of general superintendent of the E. W. Bliss Company's Canton Division, has been announced by the company. He is responsible for plant engineering and plant metallurgy as well as the welding, machine, and assembly shops, and the tool room.

◆

William C. West has been elected president of West Instrument Corp., succeeding his brother, Richard K. He was one of the founders of the firm and formerly served as vice president and secretary. **William A. Kelly** has been elected secretary.

◆

Wheelabrator Corp. announces two executive changes: **Otto A. Pfaff,** chairman and president, has retired as president and will continue as chairman of the board. **James F. Connaughton,** former executive vice president, has been elected president.

Let me show you*

**Bob Marr,*
P&J Representative
Houston, Texas.
Telephone: ME 1rose 7-3964

how changing to a P&J Automatic helped Reed Roller Bit Compan.

JOB FACTS:

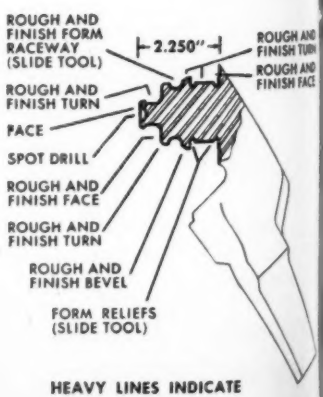
PART: *Lug for Oil Well Bit*

MATERIAL: *AISI 8720 Steel Forging*

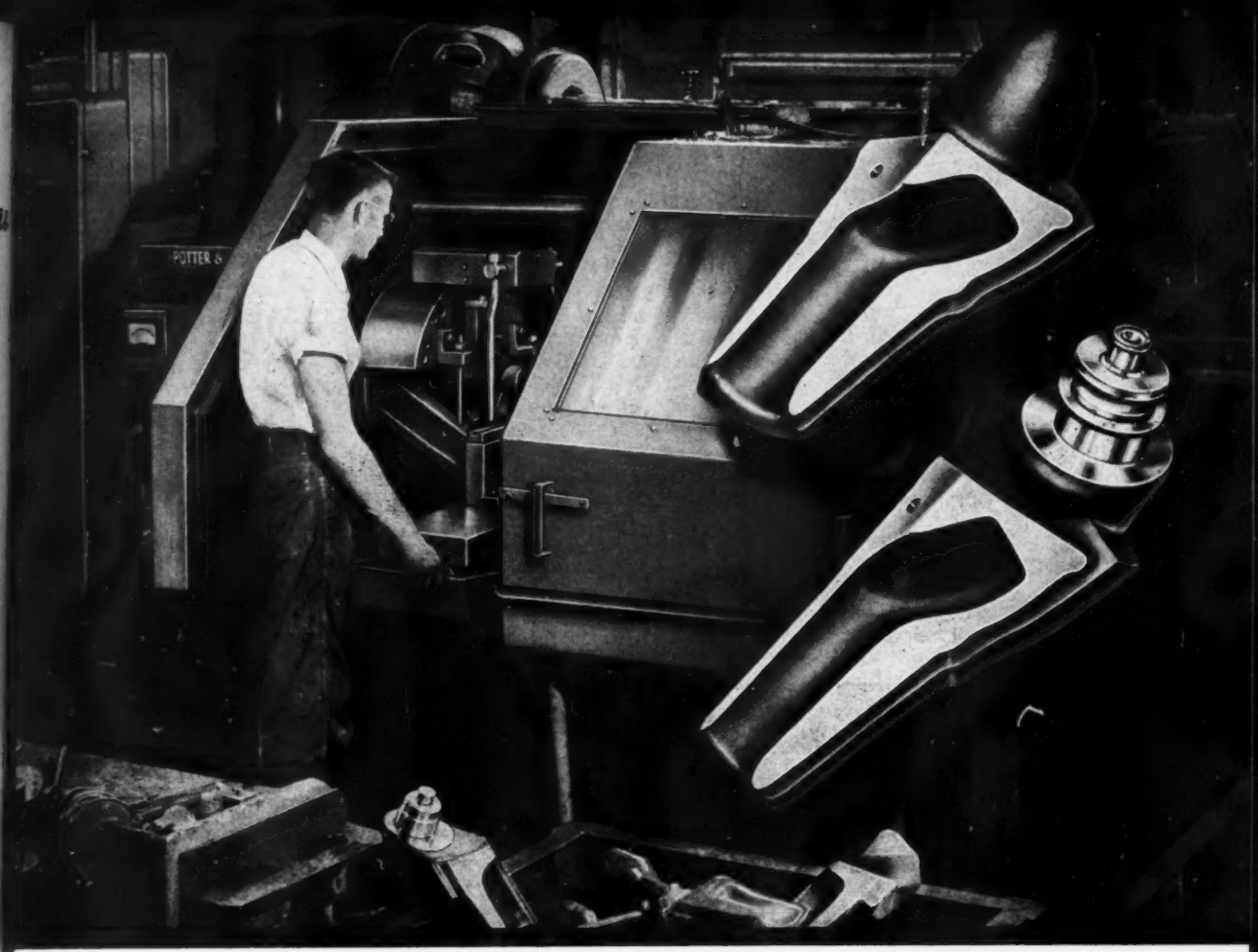
REQUIRED: *Several complex, precision cuts, with certain diameters held to .004" of nominal size.*

THE MACHINE: *A 6DRE-40 Automatic Turret Lathe*

THE RESULTS: *Part completed in single, fully automatic cycle. Machine cycle time just 4.5 minutes!*



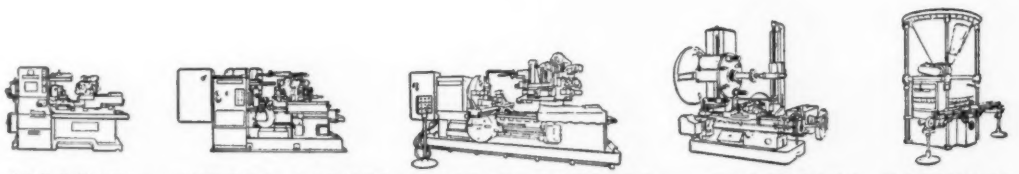
HEAVY LINES INDICATE MACHINED SURFACES



. . ELIMINATE 4 MACHINES and REDUCE OPERATING COSTS!

One of our Potter & Johnston 6DRE-40 Automatic Turret Lathes was recently installed in Houston, Texas at the plant of the Reed Roller Bit Company . . . a leading producer of oil well drilling tools. Handling a series of complex cuts on a tough steel forging, this new P&J machine and one operator have replaced 5 semi-automatic machines and released four skilled operators for other important work. Machine cycle time has been cut to 4.5 minutes. These reductions have produced important money savings *plus* a big and badly needed increase in output. And in addition to meeting all these basic requirements, the 6DRE-40 has also proved its toughness. Despite heavy metal removal on an exceptionally tough alloy, this P&J Automatic is operated successfully on a 3-shift basis with time out only for routine cleaning and maintenance.

If – like the Reed Roller Bit Company – you have tough-to-machine jobs you'd like to turn out more economically, a switch from hand or semi-automatic machines to P&J Automatics can do the trick for you too! Act today. Ask the P&J Representative in your area to analyze your requirements and recommend a production plan to meet your specific needs. If you prefer, write direct to Potter & Johnston Company, Pawtucket, Rhode Island.



AUTOMATIC TURRET LATHES . . . GEAR CUTTERS . . . PACKAGING MACHINES

POTTER & JOHNSTON

SUBSIDIARY OF PRATT & WHITNEY COMPANY, INC.

PRECISION PRODUCTION TOOLING SINCE 1898

CIRCLE INFORM-A-GRAM KEY NO. 45

Helmer Metz has been appointed service engineer, middle Atlantic states, for Anocut Engineering Co.

◆

Gisholt Machine Company has announced the appointment of **Robert H. Bruce** as general sales manager, to fill the vacancy left by the retirement of **Clifford J. Baxter. Rodney H. Stebbins** will succeed Bruce as assistant general sales manager.

◆

Roy E. Johnson has taken over as engineer of the eastern and New England districts for Firth-Loach Metals, Inc.

◆

Three changes in the sales staff of Ex-Cell-O Corp. have been made known. **Robert W. Ford** has been made sales manager, Machine Tool Division; **Herbert A. Knack** has taken over as sales manager of the Continental Tool Works Division; and **Rudy M. LaPierre,** manager of bushing sales.

◆

Appointment of **William L. Clarke** as sales and engineering representative in western New York state and northwestern Pennsylvania for Michigan Tool Co., has been made known. Buffalo, N. Y., will be his headquarters.

◆

New home office representative for The Ohio Knife Company is **Dan Jones. Charles F. Rankin** is serving in Pittsburgh.

In the expansion of Thor Power Tool Company's sales and product operation, **William J. McGraw** has been appointed general sales manager, and **Walter G. Mitchell** general manager of production development, both newly created positions.

◆

Stuart S. Carlton now serves as field sales representative for the northeastern United States for Horizons Inc.

◆

Manager of stainless strip sales for Universal-Cyclops Steel Corp. is **John C. Bingham, Jr.** Bridgeville, Pa., is his headquarters.

◆

Robert L. Hodapp has been named field engineer in the Detroit district for General Plate Division of Metals & Controls Corp.

◆

National Automatic Tool Co., Inc., has appointed **Marion W. Klippel** eastern regional sales manager. Klippel succeeds **John R. Keates** who is the sales manager.

◆

E. W. Bliss has appointed **Herman Schroll** Detroit branch manager for the Die Supply Division, and **James I. Ashley** sales engineer for the Press Division.

◆

New product sales manager for metal-cutting tools for Kennametal Inc. is **Frank L. Brugger.** He succeeds **Roger M. McCray** who has become district manager in Cincinnati.

◆

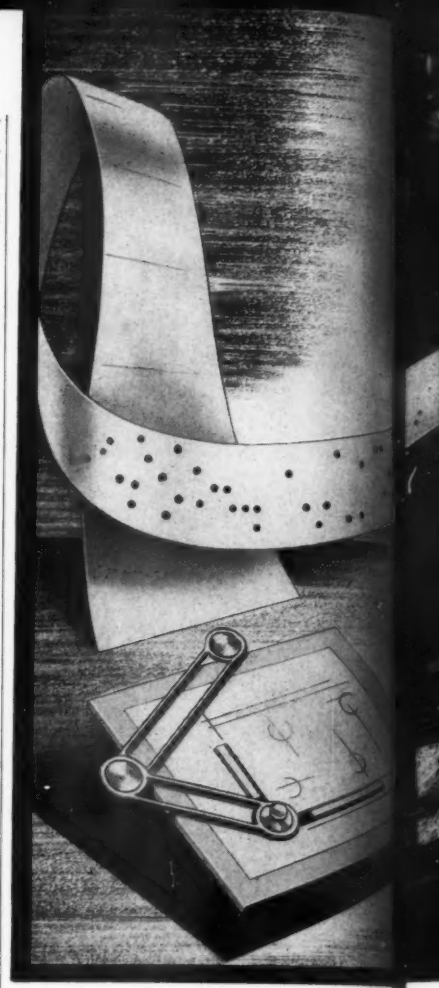
Clinton E. Smith, former assistant to the general sales manager of the Pratt & Whitney Co., Inc., is now administrative sales manager for the company's Machinery, Cutting Tool, and Gage Divisions.

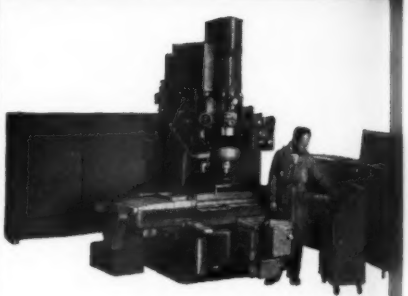
SMALL ARMATURE COMMUTATORS GROUND TO SIZE

A lathe for small armature work is now being manufactured by Rivett Lathe and Grinder, Inc. A Dumore grinding attachment is employed in the sizing technique called plunge-grinding.

This method of sizing commutators was used in the application illustrated because of two nylon flanges on either side of the ¼" commutator. Due to small dimensions, it was impossible to bring the standard lathe cutting tool up against the commutator without striking the shoulder of the flange. The problem was solved by using a grinding wheel the same width as the commutator.

Excellent concentricity between bearing and commutator is assured because the armature to be ground is held on its own bearings in carbide v-blocks.





OTHER P&W NUMERICALLY CONTROLLED MACHINE TOOLS

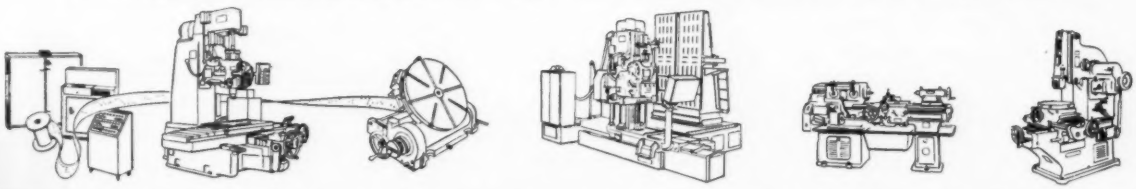
. . . include the No. 2E Vertical Precision Hole Grinder and the 42" Precision Rotary Table.

PRECISION JIG BORING TIME CUT 90% . . .

. . . **WITH P&W NUMERICAL CONTROL!** Precision work put on *predictable* production schedules, completed in as little as 1/10 the time required by previous methods. Costly human errors are eliminated. Positioning accurate to "tenths" absolutely guaranteed. These benefits are reported by Dexter Tool Company of Hazel Park, Michigan, since installing a Pratt & Whitney Numerically Controlled Jig Borer. Dexter produces precision aircraft and automotive components. Work involves 6 to 50 identically machined parts, and it's important to guarantee precision, accurately estimate production time and deliver on schedule. Positioning itself automatically by punched tape, the Numerically Controlled Jig Borer handles "tenths" limits as fast and surely as ordinary work. A Dexter spokesman states, "We think the P&W 2E Numerical is the greatest single improvement in machine tooling. It's the ultimate."

Today, "tenths" limits are common, yet profitable operation demands that you produce faster than ever before. Pratt & Whitney Machine Tools with Numerical Control can provide the right answer for you!

Write now for complete information.
Pratt & Whitney Company, Inc.
15 Charter Oak Boulevard, West Hartford, Conn.



NUMERICAL CONTROL . . . JIG BORERS . . . ROTARY TABLES . . . KELLER MACHINES . . . LATHES . . . VERTICAL SHAPERS

PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 47

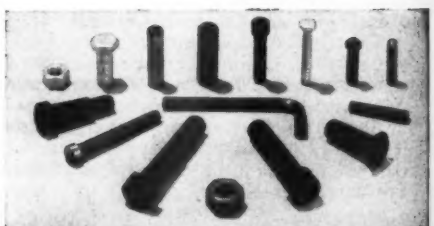
Special Process Makes CHICAGO Fasteners Stronger and Safer

These cap screws are entering a specially designed furnace. When they leave it, they are better fasteners—having received an extra margin of strength from CHICAGO's *Carbon Restoration* process.

Steel hardness depends on carbon content. In the processing of steel, some carbon is lost from the surface—leaving a thin layer of softer, weaker material. The scientifically controlled *Carbon Restoration* process replaces this carbon . . . provides uniform hardness throughout the fastener . . . assures superior resistance to fatigue, wear, shock, and vibration.

All CHICAGO socket products and heat-treated cap screws offer *Carbon Restoration* advantages. Their extra strength can mean important savings . . . longer service, reduced maintenance, and in many applications, fewer or smaller fasteners.

Over 4,000 different CHICAGO products—in a wide variety of sizes and styles—are available through your industrial distributor. He's as near as your telephone.



It pays to standardize on **CHICAGO** FASTENERS

THE CHICAGO SCREW COMPANY

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CIRCLE INFORM-A-GRAM KEY NO. 48

in ACE Drill Bushings
that makes the difference!

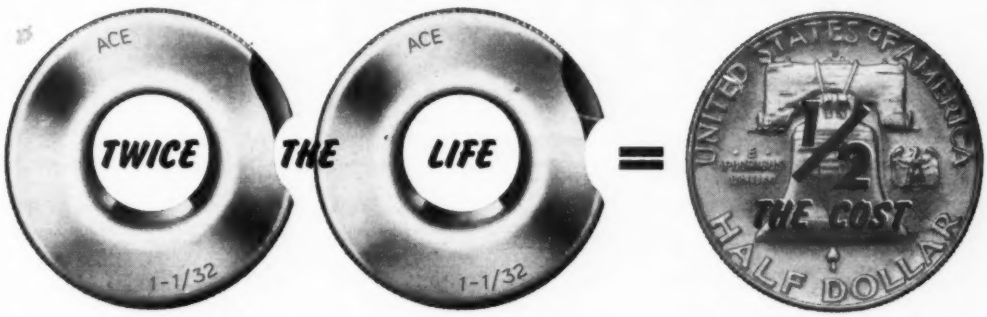
More than three years ago we began hearing such comments as, "Say, what's happening? Your ACE Drill Bushings just last and last." Others reported, "ACE Drill Bushings outwear all others". Someone wrote "ACE Drill Bushings cost us less because they last so much longer"

And then, two years ago, we told our secret. We confessed that we had been using a very special high-carbon chromium bearing steel. This new oil-hardening steel had proved to the users without our calling it to their attention, that ACE Drill Bushings were vastly superior in wearing qualities. As a result, the ACE plants were soon turning out these long-wearing bushings in ever increasing quantities.

To cope with the growing demand two additional factory warehouses have already come into being — one in Newark, N. J. to better serve the Atlantic States, and another in Detroit to benefit the Great Lakes area.

We invite you to try ACE Drill Bushings. Then you'll understand why ACE is the fastest growing name in the Drill Bushing industry. A comparative test, side by side in your own jigs — will convince you too, that *when working life is doubled — bushing costs are cut in half!* Fewer bushing replacements add bonus production savings. That's why ACE Drill Bushings of the new high-carbon chromium steel are being specified *exclusively* by cost-conscious tool men everywhere! Make a working comparison NOW with any other make bushing . . . and see "Positive-Proof" that *the steel makes the difference!*

Be Specific...
***Always Specify* ACE !**



Now! DETROIT OFFICE AND WAREHOUSE
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ACE Drill Bushings are stocked and distributed by leading Tool Supply Houses in all strategic industrial areas. Write today for new 1958 Catalog, Technical Information, Conversion Tables, List Prices, Quantity Discounts and name of ACE dealer nearest to you.

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CIRCLE INFORM-A-GRAM KEY NO. 49

ERICKSON
QUICK CHANGE
HOLDERS

Designed for Presetting of Tools

With a *single, simple grinding operation* you can adapt your present MMS tapered tools for use with *new* Erickson Quick Change Holders. This same operation provides a definite reference point for presetting of tools. Result? You get the double advantage of Erickson's *high precision with the rapid changing feature.*

Several different models comprise the line: Morse taper holders for boring mills and radial drills, milling machine holders that fit standard spindle tapers, turret lathe holders that increase turret lathe tool-holding capacity, straight shank holders with #30 or #40 MMS socket. These holders take Erickson Collet Chuck milling machine adapters in both regular and heavy duty types, end mill adapters, shell and face mill adapters, Morse taper adapters, boring head adapters, and chuck adapters for Jacobs internal taper.

AA-6875

A call or card will bring the Erickson representative on the double. Meantime write for your copy of Catalog G "Erickson Quick Change Holders."

ERICKSON TOOL COMPANY

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COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • EXPANDING-COLLETS • SPECIAL HOLDING FIXTURES

CIRCLE INFORM-A-GRAM KEY NO. 50

EDITTER: Electronic eDITorial wriTER

ONE OF THESE DAYS this job of editorial writing may be taken over by an electronic machine — a combination and ultimate development of UNIVAC, ENIAC, ERMA, AUDREY and WHIRLWIND.

This new machine, to be named, appropriately, EDITTER, will have an insatiable and quick-and-ready memory storage system plus all the computing, logic, phonetic, translating, and decision-making circuits of its illustrious ancestors.

In data processing terminology, we will feed unlimited "bits" of pertinent technical and historical information into EDITTER's programming circuitry. Then we'll push the "editorial" function button and out will come a punched or magnetic tape containing a few hundred words-worth of accurate predictions and logical decisions. They will be entirely free of man's starry-eyed and emotion-governed wishful thinking — "Just the facts, Ma'am."

For instance, into EDITTER we would feed the following "information" from David O. Woodbury's outstanding book on automation, "Let ERMA Do It," wherein he warns (as of 1956) against the misuse of any leisure time gained through automation:

"A typical effect of having nothing to do is to do nothing. Not the least danger of such a course would be an unfavorable change in our comparison with Russia. In that country everyone is worked to the limit by a slave-driving state that permits no leisure and little self-determination. We, on the other hand, are going toward more self-determination and a great deal more leisure. . . . given the same mechanical tools, it is overwhelmingly dangerous to loaf in a world that contains a vigorous, aggressive and hard-working competitor."

This bit of information, plus a last-minute "bit" about the 1958 orbiting of our little Me-Too-Nik, would certainly give EDITTER something to gnash his relays over and extrude a few feet of tape on complacency, inter-service jockeying, and government by committee!

EDITTER's memory tank and Boolean algebra logic circuits, i.e., *if-then, if-and-only-if, not, and, or* and *or-else*, would be given this choice "bit" from a Saturday Evening Post editorial of February 1, 1958:

"The Senate Judiciary Committee in 1956 published a staff study of the promises and agreements with the Soviet Union and its satellites which have been contemptuously violated in practice. As Senator Eastland, chairman of the committee, put it, 'In the 38 short years since the Soviet Union came into existence its government has broken its word to virtually every country to which it ever gave a signed promise.'"

EDITTER's logic and prediction circuits could interpret that only in this way: *if* you succeed in getting a promise from Russia, *then* you have nothing. Thirty-eight years is but an infinitesimal drop in history's infinite bucket, but EDITTER would recognize it as a sufficient length of time in which to establish the behavior pattern of a regimented class of people.

We would, of course, feed EDITTER with informational bits of our most advanced military thinking. EDITTER would make good use of a reference bit on Secretary Dulles' proposal for formation of an international commission to ensure the use of outerspace for peaceful purposes. The unemotional workings of EDITTER's electronics would automatically include Russia in any of its international "thinking" and would "remember" Russia's definitely established 38-year behavior pattern.

Also, we would load EDITTER's input circuits with factors expressed by Brig. Gen. Homer A. Boushey, Deputy Director, Research and Development, United States Air Force.

His recent Washington speech, reported in the January 31st issue of *The Christian Science Monitor*, made a fantastically appealing case for developing the moon as a "stationary" rocket-launching space platform. We would prime EDITTER's logic inventory with such *or-else* bits as: the risk to our national survival if hostile powers built there first — the sure and massive destruction that could in 48 hours be "received" from the surface of the moon that always faces the earth — the statement that "He who controls the moon, controls the earth."

General Boushey said, "Our planners must carefully evaluate this statement. For if true (and I for one think it is), then the United States must control the moon."

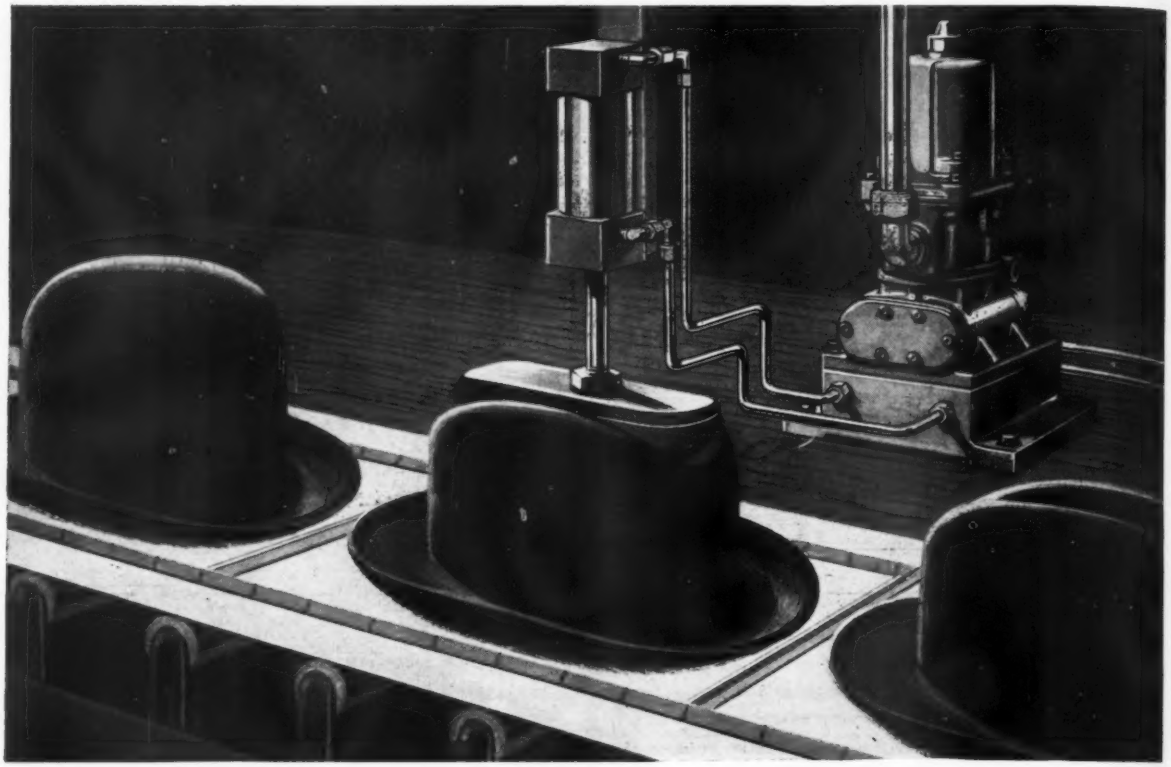
Yes, with a wealth of bits and pieces of information such as these fed into his memory, logic, calculating, programming, and processing channels, EDITTER could come up with an editorial of really awe-inspiring urgency. And why couldn't he be as right as his grandaddy UNIVAC's 1952 prediction of the Eisenhower landslide?

E. Willard Pennington

editor

What? A Homburg Dimpler!

Unlikely?...Yes, but...



Unlikely? Yes—most men will continue to give the top of their pet fedora a "just-right" push of the fist when they buy it back from the hat check girl. But this little flight into fancy does give us a chance to show a cylinder with a split personality ... able to advance softly, then retreat quickly to get the next hat into position without waste of time. It's made possible with a Ross 4-way, 5-port valve that provides a *different* pressure for each side of the cylinder.

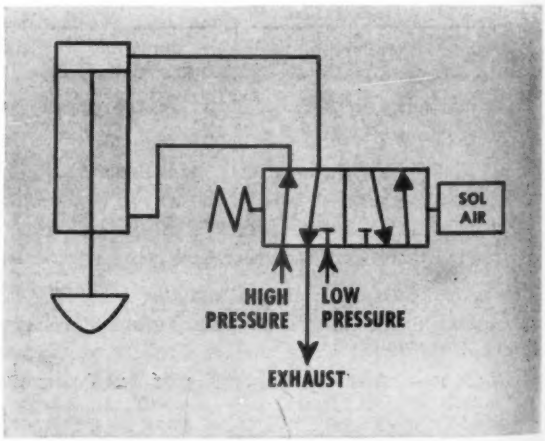
Maybe you have a serious problem that the Ross 4-way, 5-port valve can solve

The same idea of cylinder advance and retreat is put to very real and valuable use in many machines today. Perhaps you, too, have an application where *one* valve controlling *two* pressures will cut production costs. Contact your nearby Ross Service Engineer or write us for details on the 4-way, 5-port valve.

Combining engineering with ingenuity for better air control

ROSS OPERATING VALVE CO.

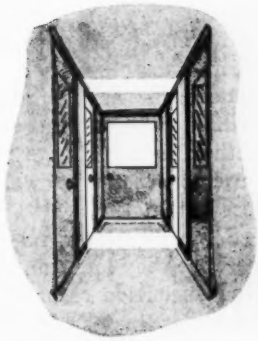
123 East Golden Gate • Detroit 3, Michigan



1. Solenoid is energized, creaser descends slowly.
2. Solenoid is de-energized, creaser rises quickly.

CIRCLE INFORM-A-GRAM KEY NO. 52

TOOLING & PRODUCTION Magazine



Distribute the Management Load:

DELEGATE RESPONSIBILITIES

The freedom and initiative allowed rarely can be spelled out in detail . . . delegation hinges more on the working relationship developed by day-to-day experience.

by Donald H. Sunderlin
Managing Partner
SUNDERLIN ORGANIZATION
Cleveland, Ohio

EXECUTIVES EITHER PERSONALLY DIRECT all details, or they hold key subordinates responsible for certain functions. When the boss looks to his subordinates for the performance of parts of the overall job, he gives them certain latitude. The greater the freedom of action, the higher the degree of delegation. The subordinates, on their part, accept an obligation to use their talents to aid in accomplishing the mission.

The personal adjustments involved in effective delegation are not created by executive mandate or a page in the organization manual. Formal statements regarding authority and responsibility can act as a guide but an organization plan does not become reality until its spirit is woven into the behavior pattern of the individuals involved. This is the point where delegation often breaks down.

In the following examples, the reasons executives are sometimes reluctant to delegate will first be discussed and then attention will be turned to the reasons some subordinates hesitate to accept responsibility.

Why Some Don't Delegate

Some executives get trapped by the fact that they can do the job better. Anyone who is conscientious and has high standards of performance is naturally tempted to reserve for himself any activity that he can do better than his subordinates. We have seen a President work for 72 hrs straight to learn why a machine would not function consistently. True, he was better qualified than any of his subordinates, but by not turning the job over to someone whose performance was "good enough," his own duties were neglected for three whole days. The choice the executive has to make is not the kind of job he personally can do, but whether the benefits to the total operation will warrant sacrificing his personal duties — organizing, planning, coordinating, controlling, and directing. Not until an executive emotionally and intellectually accepts the idea that his job requires getting things done through other people can he make full use of delegation.

Lack of directing ability is another reason some executives do not delegate. Because he

must convey to his subordinate, often far in advance, what is to be done, an executive must think ahead and visualize the work situation, formulate objectives and general plans of action, and then communicate these to his subordinate. After the two men have worked together for a period of time, this three-element process becomes quite informal, and more or less automatic.

Some people do not delegate responsibility because they lack confidence in their key men. One executive refused to turn things over to his subordinates for several reasons: He had good reason, at times, to doubt their judgment. He believed that their ideas were sound, but felt that "Papa's" experience was required to put them into effect, or that they would get the job done all right but it would cost too much. He made the statement that he saved his salary every time he went through the factory. The statement was true on a few occasions. But, what he did not realize was how much more he could have saved or the extra profits he could have made if he had known how to be a good President.

Looking back, the chief reason he didn't delegate probably was that he enjoyed messing around with production. He did what he liked to do and what he could do best. Another reason was that his key executives, having come from prominent companies, had a keener appreciation of good organization than he did. When one of them complained because the boss had cut across established lines of authority, he was accused of being too theoretical.

Absence of controls which report poor performance or give warning of impending difficulties is a valid reason for not delegating. Every executive naturally wants to avoid failure, especially failure without warning. Consequently, he needs a "feed-back" of information to keep up with what is going on. Until he has confidence in the effectiveness of such controls, he will be very cautious about relinquishing the reins.

Even with clear instructions, capable subordinates, and effective controls, there still remains the possibility that something will go wrong. The higher the degree of delegation, the more likely it is that sooner or later there will be trouble. The executive who delegates takes a calculated risk in the knowledge that, over a period of time, the gains will more than offset the troubles that arise.

Even when the boss is ready to turn over authority, there may be reasons why a subordinate will shrink from accepting it. Something within the subordinate himself or in the relationship with his boss may deter him.

Why Some Avoid Responsibility

It is always easier to ask the boss than to decide for oneself how to deal with a problem. A wise decision usually requires mental effort which some men seek to avoid. When a man can take a half-baked idea or a problem to his boss for the answer, it is not only easier but it is a way of sharing, if not actually shifting the burden.

If the habit of taking all the non-routine and tough decisions to the boss is of long standing, the executive may have to refuse to do the subordinate's work for him. Then, after throwing him in the water and letting him sink or swim, a better coaching relationship may be established.

A man hesitant to accept greater responsibility may fear criticism for mistakes he might make. Here, much depends upon the nature of the criticism. Negative criticism is always resented but constructive and impersonal review is usually accepted, if not actually welcomed. Unreasonable criticism usually evokes even sharper reaction. If the subordinate feels that unfavorable results were beyond his control, that his actions were wise in terms of the situation as they existed at the time, or that he was not given a fair hearing, he will either fight back or become frustrated, depending upon his personality.

Most men hesitate to accept responsibility when they see a lack of authority, necessary information, or the necessary management support to do a good job. Or, a man may refuse to accept responsibility simply because he already has more work than he can do. Those already overburdened shy away from new assignments which call for more worry and sweat.

Lack of self-confidence prevents some men from accepting responsibility. When a man is unsure of himself, he doesn't like to take the plunge. Self-confidence may be developed in some men by assigning increasingly difficult problems to them to make them aware of their potentialities.

Finally, incentives may be inadequate. Additional responsibility usually involves more work, emotional pressure, and risk of failure. Thus there should be adequate inducement for them to accept greater responsibility. These may take the form of pay increases, better opportunity for promotion, fancier title, more prestige, greater recognition by respected members of the enterprise, and other rewards both tangible and intangible. The subordinate affected should be given the kind of inducement that has meaning or is significant to him. Some react to one kind of lure and some to another kind.

Management Tools Are Needed

A situation could exist where the executive is willing to delegate and a subordinate is willing to cooperate and yet delegation would not be practical. For instance, without clearly defined objectives, responsibility, and the corresponding authority, delegation would deprive an organization of the direction it is already receiving. This would cause those sharing the previously centralized responsibility to work at cross purposes.

Another requirement to make delegation work successfully is a system of reporting which keeps top management informed of results and prevents departure from established policy. Without such reports, the betterment in one area might be obtained at the cost of worsened results in another.

Advantages of Delegation

Good management embraces delegation for these reasons:

- It stimulates individual initiative and focuses attention on details that are too numerous for a top executive to see; it distributes his physical load over more shoulders.
- It unifies team action by holding subordinate individuals accountable for results and preventing them from "passing the buck" to their superior; it shares his responsibility load.
- It frees the superior from the necessity of devoting time to routine matters and permits him to look forward and take preventive or constructive measures instead of remedial ones; it makes better use of the executive's time and talents.
- It trains key men all down the line to take over the boss' job; it makes the executive less dependent on a few highly placed and experienced subordinates.
- It takes the drudgery out of managing; it relieves the executive of having to be present every hour of every day; it gives the executive some time to himself.

end

SUB-MICROSCOPIC CRYSTALS MAY EXPLAIN STEEL FAILURE

Crystals, which grow as delicate plates from the surface of stainless steel, may explain a destructive failure of the metal known as "stress-corrosion cracking." This new theory was revealed in Chicago recently by Dr. E. A. Gulbransen, advisory chemist and corrosion authority at Westinghouse Research Laboratories.

Stress-corrosion cracking can occur in metal structures which are chemically corroded while under an internal or applied stress, such as a pull or twist. It can cause complete failure of the structure, and it can be triggered by such mildly corrosive substances as steam or human perspiration. It occurs, however, in objects subjected only to the internal stresses left in them during their manufacture. Stainless steel pipes and turbine blades — even coffee urns and cooking vessels — can fail by stress-corrosion cracking.

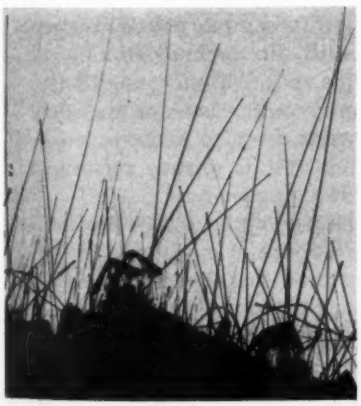


Fig. 1

Dr. Gulbransen describes the newly discovered crystals as "submicroscopic platelets of chromium oxide." They form on strongly stressed stainless steel specimens which are exposed to corroding atmospheres containing traces of negatively charged chlorine atoms — properly referred to as chloride ions.

"We think that this growth of platelets on the surface of the steel could lead to a chemical cutting of the metal," he said. "Minute crevices, therefore, might grow downward into the metal surface as the platelets thrust themselves above it. This, we believe, may lead to concentration of stress at the base of the crevices and eventually to failure of the metal."

In a typical experiment, a small piece of stainless steel wire, 0.009" dia and subject only to the residual stresses it normally possesses, is exposed to a carefully controlled atmosphere of oxygen and water vapor at a temperature of 1100°F. A small disk of stainless steel, 0.005" thick and having a 0.006" dia hole, substitutes for the wire in some experiments. Using very pure oxygen and water vapor, the surface of a typical sample of stainless steel erupts with billions of oxide "whiskers" (Fig. 1). Only about one or two millionths of an inch thick, these whiskers grow to a height 300 or 400 times their diameter. Their density is about six billion/sq in of metal surface.

"Completely unexpected changes occur in this crystal growth simply by prestressing the stainless steel and adding only the slightest trace — less than five parts per million — of chloride ions to the atmosphere," Dr. Gulbransen said. Instead of long thin filaments, rows of thin, upright, parallel plates (Fig. 2) are found growing in a definite crystallographic direction. Analysis shows them to have the characteristic structure of an oxide of chromium, Cr_2O_3. Chromium is a metal normally present in stainless steels, and each tiny plate appears to be a crystal of its oxide.

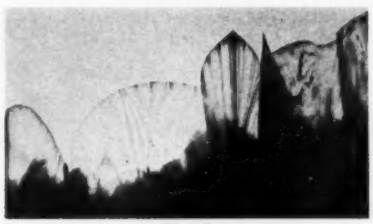


Fig. 2

For some time scientists have known that the chloride ion is a major factor in producing stress-corrosion cracking of stainless steel. It now appears that chloride ions could stimulate the growth of these unique, plate-like crystals in a strongly stressed metal; which growth might result in cracking and the ultimate failure of the steel.

Check Finish Smoothness Right in the Shop

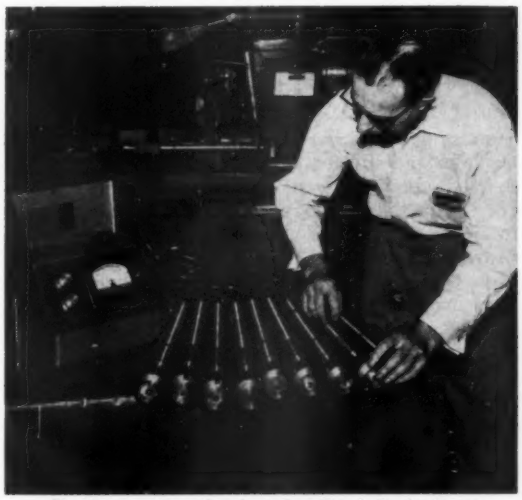
THE PAST FEW YEARS HAVE SEEN SHARPLY rising demands on the part of manufacturers for closer tolerances and smoother finishes on the parts which they buy.

Erie Bolt & Nut Company — custom manufacturers of a diverse line of special and standard bolts, studs and cap screws — is using a Brush Surfindicator to insure that exacting customer specifications are met. At the same time, use of the Surfindicator is reducing grinding and polishing time in the shop and is insuring conformity with customers' micro-finish requirements.

The Erie, Pa., firm supplies bolting material for use in practically all types of medium- and heavy-duty equipment and construction — stationary and railroad diesel engines, heavy pumps, compressors, road building equipment, nuclear power facilities, etc. Much of the fastening equipment used in these end products must be able to withstand severe stress in high and cold temperatures. The slightest nick or scratch in an otherwise smooth surface can become a stress point which eventually will lead to failure.

The Surfindicator is a practical shop instrument and is used as a testing device right at the point of manufacture. It is a lightweight, portable, self-contained unit which can be calibrated to measure surface roughness ranges from 1 to 1000 micro-inches.

The manually operated pickup arm contains a 0.0005" tip radius conical diamond stylus, which accurately traces the minute hills and valleys in the surface of the material being tested. Speed of traverse over the surface is not critical.



Checking surface finish with a Brush Surfindicator.

Readings on the unit's meter are controlled by a five-position range selector switch. Readings are made directly in average micro-inches, as recommended by the American Standards Association.

At Erie Bolt & Nut, sample pre-production bolts are tested with the Surfindicator on all surfaces requiring a specified micro-inch finish to assure conformity with customer specifications. Frequent tests are also made throughout the production run to insure continued adherence to finish requirements.

Not only has the use of the Brush Surfindicator reduced the amount of machining, grinding and polishing time to achieve the micro-inch finishes specified by customers, but in achieving the optimum finishes it has prevented overfinishing, which can be as costly to the manufacturer as underfinishing. end

The Case For
HORIZONTAL JIG BORING

by William E. Hoffman
Associate Editor

FROM THE PRE-JIG BORE DAYS to the present, with the precise "instruments" now available for toolroom or production shops, there has been quite a change in the methods used for precision machining of holes.

Consider the grievous methods by which the toolmaker, only 30 years ago, had to determine a hole location before boring it. He probably laid out the center by two intersecting scribed lines. If he used a lapped scribing tool with gage blocks on a surface plate, he might have come within 0.0005" of true location. It is not likely, however, that the centerline of the proposed hole would be as per this plan, for after layout he would have to make a start-center for his drill with a center-punch (more error) and from this he would locate his drill for the initial opening (error possible). During drilling he knew the drill would walk some, even after careful grinding; then too, his machine may have had bearing trouble. The metal he was machining may also have lacked structural uniformity, producing further inaccuracies.

After an opening was made, he was ready to go in with a single-point boring tool. Depending on the accuracy required, he might be able to get away without further setup other than locating the center of his spindle by picking up the sides of the hole.

If greater accuracy were demanded he might have to go to the button technique of center location. Here the shank of a button would be fitted loosely in the existing drilled hole, and the button would be secured by a nut on the end of its shank from the back of the part. Now he would start the worrisome process of tapping the button into true location by indicating its sides in relation to a reference point. Even though he had jockeyed the button into position within 0.0002" of its true location, he still had to position the centerline of the machine spindle with the button. All his care to this point would only mitigate the error for

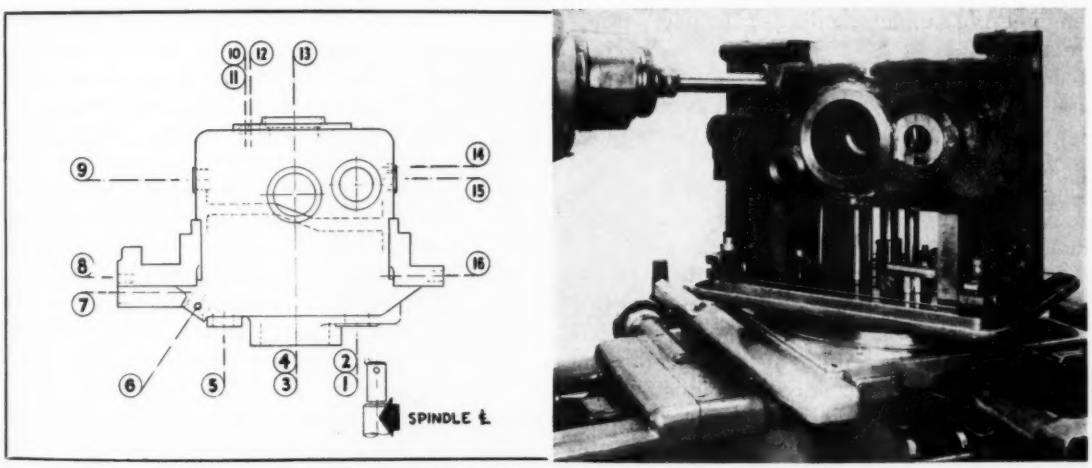


Fig. 1. The plan drawing here shows an excellent example of a part that can be machined on a horizontal jig borer, whereby a great saving in setup time can be realized. The photograph on the right shows the casting in position for boring operation No. 6 of 16 operations which were done with one setup.

Fig. 2. This photograph taken at the Thompson Products Company shows four of their horizontal jig borers in action. One of the many boring jobs being done at Thompson is a rod mechanism for an atomic submarine which is on the table of the machine in the foreground.

he could only bore within the accuracies of the machine.

We have been talking about the locating of only one hole. If we multiply this procedure by the number of holes in any workpiece, we get a good idea of the effort that went into so-called precision work of a few years back. Most of the effort of machining *then* was put into setup.

By setup, we mean the positioning of the work on the work surface of the machine in relation to known reference surfaces on both. Of course, the time necessary for any setup is dependent on the tolerances involved, the size and complexity of the part, and the ease and/or lack of ease with which its reference surfaces can be picked up by an indicator. Reference surfaces of a part depend on its dimensioning which in turn is determined by engineering's understanding of the part's interrelationships.

If after the initial setup (sometimes taking hours) a part can be moved to its next machining position within seconds, a tremendous amount of time can be saved. Additional positioning of the workpiece is most easily done by moving the machine components, whose positions can be noted by direct readings.

We will always need craftsmen, but the necessity for their rubbing a rabbit's foot, while fretting through an operation to a close tolerance, thankfully is a thing of the past; the machine tool builder has supplied Industry with machines of ever greater accuracy, and versatility, as an aid to the reduction of setup time. Among the number of available machines are the jig borers; since their inception, the *vertical* jig borer has alone carried the burden of precision toolroom boring and limited production.

Just as vertical mills and horizontal mills were needed, we have needed a horizontal jig borer. The Dixi horizontal jig borer does not take the place of the vertical machine, but we cannot help noting for you the advantages this machine offers in doing a generous portion of jig bore work, in less time. Conversely however, there are many jobs which must still be done on the vertical machine for best time values.

It is indisputable that final accuracy is hindered by each setup step added to any machining. The final error in a part and/or required accuracy is affected most by transitional error from relocating the part for each operation.

If this relocating can be done by moving the machine table or spindle, the operator has only the built-in error of the machine and his own ability to set the machine to contend with. Neither of these contentions are of any consequence as today's machines are accurate to within a few ten-thousandths of all check-point requirements and easily set to within even closer allowances.

If a flat workpiece has many operations normal to its flat faces, these can best be performed on a machine with a vertical spindle. On the other hand, if a workpiece is more in the nature of a box, with operations normal to several sides of the box, these operations would best be performed on a jig borer with a horizontal spindle.

In the first instance, where the piece is for the most part flat, it can easily be laid on the table of a vertical machine and set up without the addition of anything but parallel bars to permit tool clearance if through-boring is required. Being flat there is usually ample

clearance left between the work surface and the up position of the spindle for changing tools. If the part is large and extends into the throat of the vertical machine, and the hole pattern is of an overall nature, a rotary table can be used with ease, in order to rotate the part into a convenient spindle position. Here the work can probably be done in one setup.

On the other hand, if the work is of the type shown in Figure 1, where operations are to be performed on several sides of a box-like structure, it is economically mandatory that the work be performed on a horizontal jig borer. One setup is all that would be required for the 16 operations.

If either of the jobs mentioned above were to be switched to the other machine (from vertical machine to horizontal and vice versa), a great amount of extra setup time would be involved to complete the same job, and accuracy would be seriously impaired. For example, if the flat workpiece were to be done on a horizontal jig borer, a rotary indexing table would have to be used in a vertical position. The farther away the machining is done from the horizontal table, the greater the danger to accuracy from the thrust of the cutter. The biggest problem here, however, would be the "trial" of placing the part on a vertical surface. Even on a production basis, whereby locators might be attached to the vertical face, a flat horizontal position would be much easier to work on.

A popular misconception, however, about horizontal machines is that there will be error, from spindle overhang, as the spindle reaches for the work. This is not so because the spindle feed can be stopped and the work fed into the cutter by table feed. This creates a desirable constant tool condition.

Taking the other example of the box-type part (Fig. 1), producing it on a vertical machine would also require a rotary table positioned vertically, but trouble could be encountered if the part were large. There might not be enough room left between the spindle nose and the work to change tools, or the operator will be working at an inconvenient height. Also there may be too much error encountered from the part overhang, or the tool thrust to an unsupported part may cause out-of-tolerance conditions. If this were the case, setup of the part may have to be done on the machine table and the operations performed on one side at a time. This extra setup would prohibit competitive bidding.

A good indication of the value of a procedure or method of operation can be had by observance of an operator's acceptance after a reasonable indoctrination and time trial. A craftsman takes pride in his work and prefers to use methods which will allow him to do himself proud. If he has to work by devious procedures, he is constantly working in doubt of the outcome.

In the Accessories Division of Thompson Products there are four horizontal jig boring machines (Fig. 2). The operators are enthusiastic for now they have procedure versatility. Previously they were bound to do all their work on the vertical machines whether the jobs were suited to them or not. They demonstrated their enthusiasm by going completely through a part setup for us and running through the operations. After the initial setup, each individual positioning required only seconds.

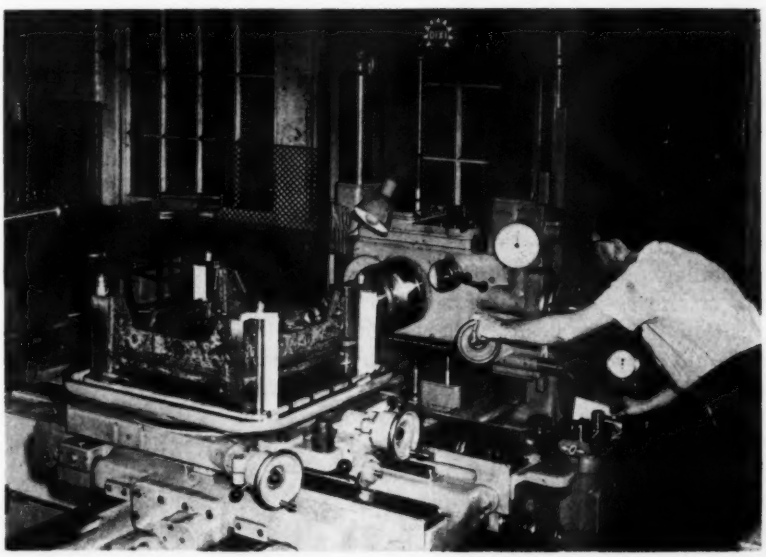


Fig. 3. The operator of this horizontal jig borer at the Warner & Swasey Company is making a setting of the spindle head. He is shown looking at the diamond etched scale through the optical eyepiece. The toolroom foreman says this machine fulfills a long-felt need. They have a great variety of work and the two types of jig borers (they also have vertical machines) complement each other.

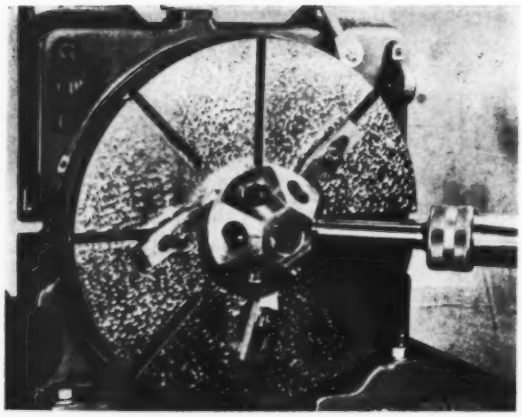


Fig. 4. The workpiece here is full of holes, at compound angles, whose centerlines must intersect within 0.0005" of each other. The operator tells us the boring and facing was easily done with a Dixi 450 precision rotary table in a vertical position. This table is equipped with a microscope for quick and easy setting, to within one second, of any angular position.

The case for horizontal jig boring was also well pointed up in a recent visit to the Warner & Swasey Company. In Figure 3, a "tumble" drill jig is shown in their toolroom being reworked on a horizontal jig borer. The jig rework was necessary due to the part locating surface being worn.

In order that you may more readily recognize the problem, and since the clamps, locating plugs, and bushings have been removed from the jig, a short rundown on the production use of the jig being reworked may be in order: When loading a part into the jig, it would be sitting on the bed of a radial drill press in the same position in which it is shown here on the jig borer. The part would be loaded onto the finished locating surface of the jig (the top of the web) and, after clamping, the jig and the part would be tumbled together to respective sides for drilling.

In rework, a new part locating surface was milled first, after which 20 or so bushing holes on three sides had to be brought back into their original relationship to that surface. The job was a natural for a horizontal jig borer as only one setup was necessary for boring all holes in all three sides. To do this on a vertical machine would have required either three setups or the use of a rotary table in a vertical position. Besides positioning the rotary table, it would not have been easy to set up the part on a vertical surface. Then too, accomplishing this job on a vertical machine would be contingent on the size of the machine and whether or not there were sufficient room between the machine table and the uppermost spindle position.

In Figure 4 a boring operation was accomplished with a horizontal jig borer spindle. The setup involved positioning the part on the vertical rotary table which was mounted on the built-in rotary table of the jig borer. The ability to rotate in both vertical and horizontal planes accounts for infinite compounding of spindle approach to work. With the exception of the need for a rotary *tilting* table, *this* job being small could have easily been done on a vertical machine.

Through-boring has always been difficult. In cases where bearing surfaces are to be in line, within close tolerances, the method of accomplishing the feat is most important. In any event, boring through one hole and continuing on through the other one is almost impossible as the cutter will be too far from its support for great accuracy. An inner support could be devised, but its alignment would not be easy and extra time and tooling would be needed.

If the in-line holes are close enough to permit line-boring, it would best be done on a vertical machine as no overhang of the tool would be experienced. But often the holes are not close enough to make this feasible and part reversing is necessary where boring is done from both directions. With the table versatility of a horizontal jig borer bringing the work close to the cutter, to negate cutter overhang, and its ability to reverse the work for approach from either end, in-line boring becomes a simple operation.

The ability to reverse a wider range of workpieces is one of the most important features of a horizontal jig borer. Being horizontal, the spindle doesn't go out of its convenient working height as the workpiece increases in size. The table can be backed away from the spindle, reversed, and brought in for boring from the opposite side with considerable ease.

Great accuracy, savings of time, and the elimination of errors can be attributed to the use of optical control in any machine so equipped. The Dixi machine uses optics for setting all machine components. Some of the savings shown to us in reviewing case histories were phenomenal.

A desirable feature inherent in any jig borer is its use as an inspection gage. Especially useful in this sense, due to its direct scale readings, is the horizontal jig borer shown in Figure 3. The table carrying the workpiece can be maneuvered easily for each check point and readings are made quickly.

If a jig borer would be an important adjunct to your facilities, we suggest you look at both types in order to select the one best suited to your needs. end

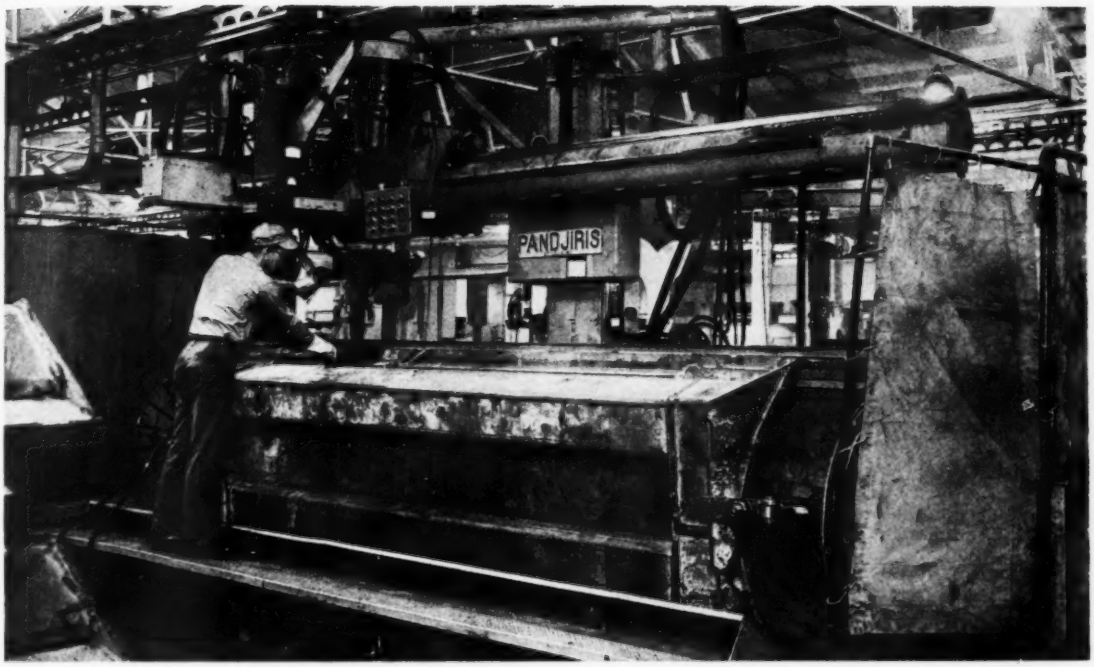


Fig. 1. Making one of several automatic longitudinal welds on a blade for an International Harvester bulldozer on an automatic machine. Trunnion supports make it easy to rock the blade to several other positions under the Lincolnweld head that traverses a track on the boom.

AUTOMATIC MACHINES EXPEDITE ARC WELDING

by D. L. Hansen
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HIGH SPEED ARC welding is continuing its transformation of fabricating practices in the Tractor Works of International Harvester Company. There, a large building, formerly used as a foundry, has been converted into a weldery and is given over to the production and assembly of tractor components and to a variety of equipment applied to tractors manufactured in this huge plant. Weldments provide strength and rigidity with moderate weight that afford high resistance to wear and hard usage encountered in construction and related industrial applications.

Submerged arc automatic welding is widely used, especially where the assembly is one readily set into a machine and is needed in quantities sufficient to warrant the machine itself and such fixtures as may be required. Some semi-automatic arc welding with "squirt" guns is also done where it is adaptable and effects economies.

Typical of large assemblies that involve much arc welding are the blades required on bulldozers and on graders. These are built up chiefly from steel plates most of which are formed in brakes or rolls to shapes that afford

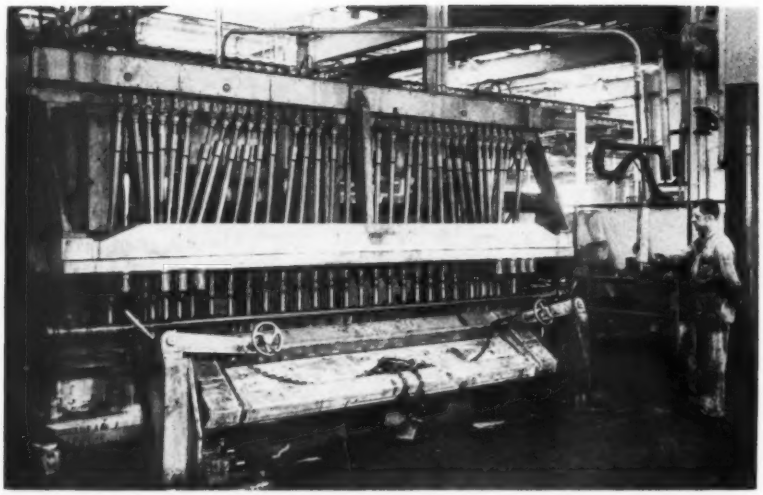

Fig. 2. When welding on a blade is completed, it is set in this "Hole Hog" for drilling simultaneously 34 holes for bolts that will fasten the detachable cutting edge to the blade. This permits the cutting edge to be replaced when it is badly worn.

the required strength and stiffness.

One such blade partly fabricated appears in process of automatic welding in one of several automatic machines, Figure 1. This includes a heavy curved plate shaped by rolls and forming the front of the blade. Welded to this plate are stiffening and supporting members that involve several long automatic welds. Some of these stiffeners, including two long longitudinals, have deep trough-like sections. There are also transverse stiffeners of U-shape sections that are applied after the longitudinal welds are completed.

Before the assembly reaches the machine the major components are tacked by arc welding in a trunnioned fixture that, of course, holds the part in correct relative position. In the Pandjiris machine, Figure 1, the tacked assembly is also mounted on trunnions because there are several parallel welds to be made and the trunnions make it easy to turn the weldment into successive positions in which each seam will come directly below the welding electrode.

Welding is done with a Lincoln Electric automatic head that is arranged for traverse on a carriage moved at welding speed along a stiff tubular boom that is supported near its center on a column. Adjustments of the head can be made vertically and transversely to bring it to the best position for each weld. Mild steel, L-60 wire, $\frac{5}{32}$" dia, is fed through the head from a reel that moves with the carriage supporting the head. On the head, there is the usual hopper for No. 840 agglomerated flux that is fed automatically to keep the arc covered.

Welding current of 450 amp at 28 v is supplied by a DC motor generator of 750-amp capacity via heavy flexible leads, supported as shown in Figure 1. Welding speed is adjustable, but is commonly set at about 35 ipm for the seam at the top edge of the blade and about 20 ipm for the bottom seam. For a given current input, the slower the speed, the heavier is the bead laid down. Bead size required is determined by the metal thickness at the joint and by the stress the joint must withstand.

More than one pass per seam can be made if required, but a single pass commonly is adequate in blade welding. As the current density always is kept high, however, deep penetration is always attained and welds of high strength result. Fine adjustments of the head are made with the usual control knobs, and they are set so that a tracking light carried on the head throws its light spot on the center of the seam because, then, the electrode will follow the center, as desired.

After one seam is completed, the blade is rocked on trunnion supports and the head is reset to make the next seam. In some positions, a sufficient depth of flux to submerge the arc does not pile up and a strip of wood or metal is placed temporarily parallel to the seam at a point such as to increase flux depth. Flux that drops off falls into a trough below the weldment and above a belt that carries it to a shaker screen. That passing the screen is elevated by a vacuum system to a high hopper where mixing with new flux, added as needed, occurs. Feed from the high hopper to the lower one on the head is automatic.

Blades are produced in different sizes, but, generally, require six to eight parallel welds that run the length of the piece. A dial that turns with the piece is marked at angular intervals at which welds are needed and aids in making quick settings. When all parallel welds are completed, the weldment is moved to a cradle fixture where transverse stiffeners,

already formed to fit around the longitudinals, are applied and tacked for hand welding.

Hand arc welding is used where the positions and the lengths of the seams are not such that automatic welding is feasible. Hand welding is done on positioners that are set to bring the blade to convenient position for the operator. To increase welding speeds, iron powder type electrodes are used.

Many welds are made on each blade, and the heat applied causes some distortion of the assembly. This is corrected subsequently and without detriment by straightening under a 400-ton hydraulic press. When welding and straightening are completed, the blade goes to the "Hole Hog", Figure 2, where 34 precisely spaced $^{15}/_{16}$" diameter holes are drilled at one time.

These holes are for bolts that fasten the heavy hardened cutting edge to the blade in a later assembly. Bolting is done in preference to welding because, in service, the cutting edge takes most of the wear and requires replacement long before the blade weldment is worn out.

Besides large weldments, many of smaller size are produced. Among these are hydraulic assemblies that must withstand high pressures without leakage. One such is shown in the machine, Figure 3. This machine is used to arc weld fittings, including a steel pivot bracket having trunnioned pins and flanges, to heavy wall steel tube that constitutes a hydraulic cylinder. In this case, the pivot bracket includes a sleeve machined to fit over the tube.

To make the fillet welds required, the tube is supported in a fixture that rotates the tube at welding speed, usually about 22 ipm at weld diameter. Above the tube is an automatic head supported from a carriage that can be moved along a track on a supporting beam. Mounting of the head is such that it can be swiveled 45° each side of center. The head is set and locked at one side or the other, so that the electrode aims at the center of the joint to be made.

When current, supplied by a 750-amp generator, is turned on, flux feeds from the hopper and the $^{5}/_{32}$" L-60 electrode wire feeds down and strikes the arc. At this instant, rotation starts and the weld is produced in a single slow revolution plus a slight overlap. Although a considerable amount of the No. 840 flux fed falls off the rotating tube, a dam is so placed as to cause ample build-up to cover the arc. Unfused excess falls into a hopper and is collected for reuse.

Flux is fed from the head hopper, but it is kept filled via a flexible tube from a larger hopper at a higher level. Speed can be varied to suit the size of tubing used. When one weld is completed, the head is moved to produce a similar bead at the opposite end of the sleeve. End flanges are welded in similar fashion after resetting the head, but they require only one weld each.

Before the assembly just described is produced, the pivot bracket employed is built up by adding a pin boss at each side of the steel sleeve. These bosses are first tacked in place

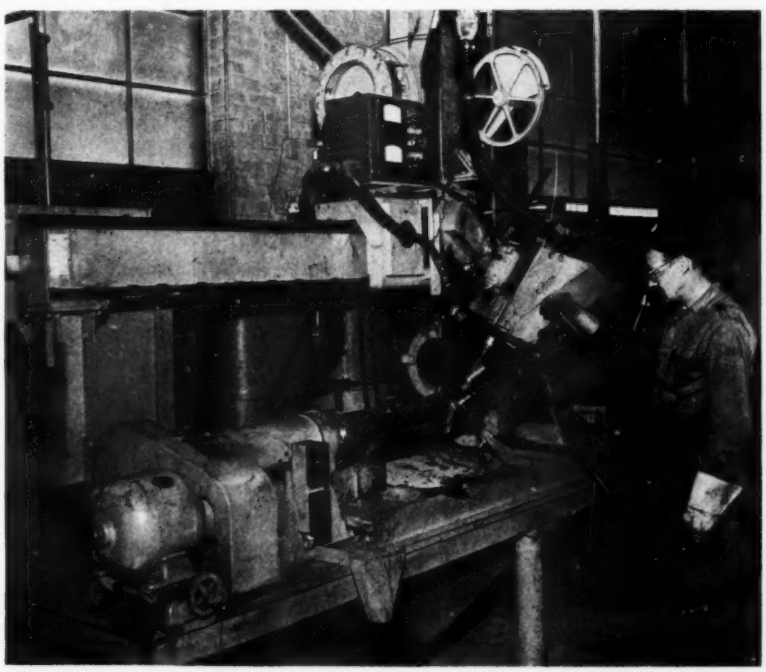

Fig. 3. Welding a pivot bracket to a hydraulic cylinder as the latter is rotated in an automatic lathe-like machine whose welding head can be set in various positions on the elevated track and also can be tilted 45° either side of vertical.

Fig. 4. In this automatic welder, the head remains fixed, but the fixture, holding a sleeve to which pivot bosses are welded, rotates and also is moved in and out by a cam. After the weldment is shifted 180°, the second pin boss is welded to the sleeve.

by hand arc welding. Then the tacked assembly is placed in the automatic arc welder, Figure 4. In this machine, the fixture clamps the sleeve by its ends, but is supported on a shaft flange that rotates both fixture and weldment about the axis of the pin bosses.

This rotation is done, at a speed suited for rapid welding at the pin flange periphery, under the automatic head mounted at the angle shown in Figure 4. After one weld is made, the weldment is turned 180° about the sleeve axis. This brings the second pin boss below the head and the second weld is made in the same way.

As the pin boss fits a cylindrical surface, the path that the electrode must follow is not in a single plane. Hence, it is necessary to move the workpiece in and out slowly, but continuously, to make the weld along the required path. This is accomplished by a cam that gives the fixture the axial motion needed. As this motion is automatic, all the operator need do after loading the tacked assembly is to start the welding cycle for each pin boss and shift the weldment 180° between welds.

As soon as the cycle starts, flux feed begins and the electrode wire feeds down to strike the arc. Thereupon, rotation starts and the weld is made while the weldment rotates. Flux feed is fast enough to keep the arc covered, but all flux not fused drops off into a hopper and so does the fused flux as it cools.

In this machine, operation is so fast that two welds per piece can be made on 50 pcs/hr. About all the operator need do is to load and unload workpieces, shift them end-for-end at the proper time and see that the machine functions as intended, as the welding itself is fully automatic. Flux and wire used are the same as for the machine in Figure 3 and current is supplied by a 750-amp generator. end

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ASSEMBLY OPERATION INCORPORATED IN MACHINING SEQUENCE

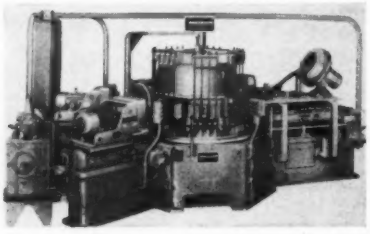
An improved production method has been developed that incorporates assembly with various machining operations.

This is done on an Economatic, built by the Buhr Machine Tool Company, in the machining and assembly of steering gear components at the rate of 489 pcs/hr.

The machine performs operations as follows:

1. Manually load four pieces and automatically power clamp.
2. Spotdrill for countersink.
3. Drill thru for ream.
4. End cut ream to straighten hole.
5. Size ream for close hole tolerance.
6. Press in pin.
7. Automatically unclamp and manually unload four pieces.

The automatic assembly unit incorporates a gripping device which unites the work holding fixture and assembly unit into an integral mechanism. This design eliminates any excessive load on the index table that might be generated by the pressure of pressing the pins into the shafts. Individual hydraulic cylinders are used to press each pin and maintain a close positional tolerance required in the sub-assembly.



Other features of the machine include: precision machining of standard and special machine and fixture parts for interchangeability and ease of maintenance; automatic lubrication of all moving parts; hardened and ground detachable steel ways; seven position power operated index table; J.I.C. standards throughout.

Case Histories Demonstrate

How Live Roller Bearing Pilot Bushings Hold Tolerances and Cut Costs

by Philip F. Donley
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TOOL DESIGNERS AND ENGINEERS recognize the advantages to be gained, in jigs and fixtures for drilling, boring and reaming, from use of a pilot bushing that incorporates the rotating or "live" principle of construction. This type of bushing has to meet the qualifications that are considered ideal for pilot bushings, which are: free running, lubricated, low in operating temperature, and free from bushing wear.

The Jergens live roller bearing bushing, Figure 1, has all of these qualifications. Its live principle is based on the bushing member rotating with the tool or pilot bar. This rotating motion is accomplished by two sets of taper roller bearings, Figure 2, that are assembled between the bushing member and the main housing. These roller bearings feature a wear-adjust principle that contributes to maintaining concentric machining. Thus the rotating principle of the Jergens live bushing qualifies it to be free running.

Lubrication is provided for by means of a grease fitting through which grease is shot into the bearing cavity.

Precision manufacture, and a seal, built to prevent coolants, abrasive grit, and dust from entering the roller bearing cavity, are factors that eliminate costly bearing failures and as-

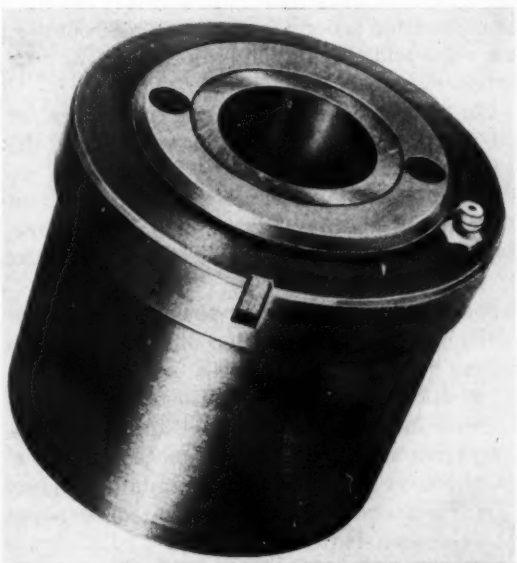


Fig. 1. The live roller bearing bushing shown is a precision pilot bushing incorporating the principle of the jig bushing but refining it by building into or around it a sealed rotary and thrust action to resist wear and maintain extreme accuracy.

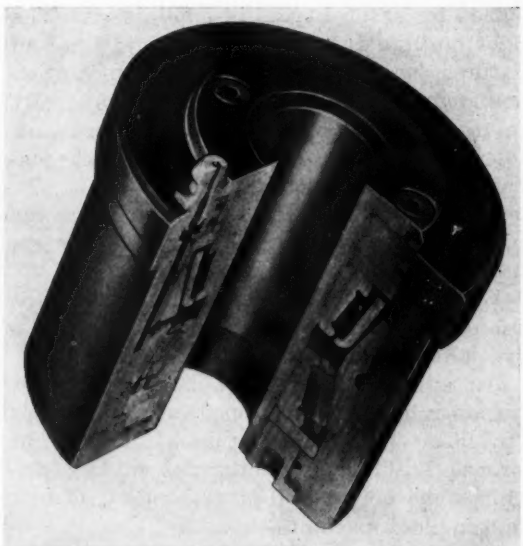


Fig. 2. Cutaway view of the roller bearing bushing. It is sealed against coolants, fine powdered abrasive grit and dust entering the roller bearing cavity.

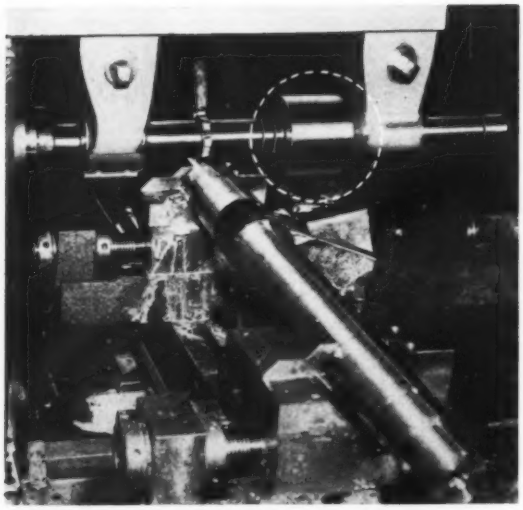


Fig. 3. Live bushing installed on Gorton Model 3-48 milling machine at General Electric, DC Motor Department. Company reported estimated savings of $1300/yr from increased feed, accuracy, and cutter life.

sure the user these bushings are maintenance-free.

Because the bushing member is free-running, and rotates with the cutting tool, generation of heat due to friction is held to a minimum. It therefore will operate without any appreciable temperature build-up.

Since the bushing member rotates with the cutting tool, friction between these parts is reduced to a minimum, with the result that bushing wear approaches the point of elimination.

These live roller bearing bushings are designed for several types of applications. The pilot bushing is being designed into jigs and fixtures, special machines, and automation equipment. They are being used principally in mass production to maintain close work tolerances for long periods of time while machining large quantities of parts.

Bushings, built on the same principle as the pilot bushing, with appropriate adaptors are used for boring mill piloting applications.

Where center distances will not permit the use of a taper roller bearing type bushing, a special needle bearing unit can be substituted.

An entirely different application for live bushings has been developed for the machine tool field. They are being used to replace the bronze bushings on horizontal milling machines and boring mill outer supports of new and in-plant machines.

There are two types of live bushings for outer support applications, extended and built-in. The extended type is constructed with an extension that replaces the milling machine outer support bronze bushing. The live bushing proper remains outside of the support as shown in Figure 3.

The built-in type is installed wholly within the outer support bushing cavity where the cavity is of sufficient size to accommodate it.

These live bushings are widely specified throughout industry to support tools during heavy cuts and feeds. Users report that the Jergens type of live bushing is permitting feeds and speeds to be increased up to 200% while eliminating bushing wear and maintenance, and holding close piloting tolerances.

Carbide Tooling

One of the biggest advantages of the live bushing, according to operators now using it, is its successful incorporation in jigs, fixtures, and machine tools to permit the advantageous use of carbide tools. They report tremendous increases in speeds and feeds permitting the utilization of carbide tools to their full capacity. Many of these users have found they can now use carbide tools on old equipment and bring this equipment up to new competitive levels.

Performance Reports

Users report that these live bushings increase maintainable feeds; make possible the advantageous use of carbide tools; need no additional machine power; eliminate tool breakage; increase tool life; and increase speed and precision of cutting. Users also report substantial savings in maintenance from elimination of bushing wear and bushing replacement; twisted arbors; frozen bushings; chatter; bar wear and scoring; and allowances for heat expansion.

The following case histories are typical of those reported by many companies all over the country:

General Electric Company, Direct Current Motor and Generator Department, Erie, Penna.

Job: Milling blind keyways on armature shafts.

Application: Replace bronze bushing on outer support with installation of a Jergens milling machine bushing on a Gorton Model 3-48 milling machine with Gorton 150 milling machine adapter on outer support (Fig. 3).

Performance: Report an estimated savings of $1,300/yr by increasing maintainable feed from a maximum of 4¼ ipm to 10¼ ipm. Increased cutter life. Improved accuracy and finish. Eliminated the scraping, fitting, and aligning of bronze bushing previously required on an average of once every week.

Owens Bucket Company, Cleveland, Ohio

Job: Bore and counterbore on a Cincinnati-Bickford Super Service radial drill, bucket hinge holes up to 5″ bore and 8 1/16″ counterbore with a stock removal varying from ¼″ to ⅜″. Material — Farrell 85 steel castings. Using carbide tools and a rough finish cut, bores were running as much as 0.005″ out of round and straightness. Feeds and speeds were reduced to maintain tolerances, increasing machine time and reducing tool life.

Application: Roller bearing live bushings were installed in the bottom and top plates of the fixture (Fig. 4). So as to have rigidity on both sides of the tools, the bushing in the top plate has a hardened OD ground for a slip fit, permitting it to retract from the fixture with the bar, eliminating the necessity of removing the tools on completion of each piece.

Performance: Work can now be completed in one cut with a tolerance of 0.0005″ in size, roundness and straightness with the correct speeds and feeds. No bar clearance for heat expansion is necessary. These results have been constant for 14 months of operation. Bushings have required no service whatsoever. Report an estimated savings of $36/part produced.

B-K Machine Company, Whittier, Calif.

Job: Mill 10 ½″ splines, each approximately 30″ long, around end of a 4¼″ OD oil tool mandrel. At time of milling, the mandrel of 4140 steel has been heat-treated to 302 Brinnell.

Application: Outside tooling consultants determined that performance of the Kearney & Trecker No. 2 mill could be improved by replacing the bronze outer support bushing with a Jergens milling machine bushing. The increased feed from use of this bushing made possible the advantageous use of a Nelco Tri-Helix carbide-tipped cutter to replace the cutter then in use.

Performance: Feed when milling splines was increased to 7¼ ipm from previous 2 ipm. No additional machine power needed. Longer cutter life. Faster, more precise cutting. Increased profits for company and lowered cost of job to customer.

Budd Company, Red Lion, Penna.

Job: Mill steel forgings for Budd magnetic disc brakes.

Application: Jergens milling machine bushing installed to replace bronze bushing on outer arbor support of a No. 4 Cincinnati horizontal milling machine.

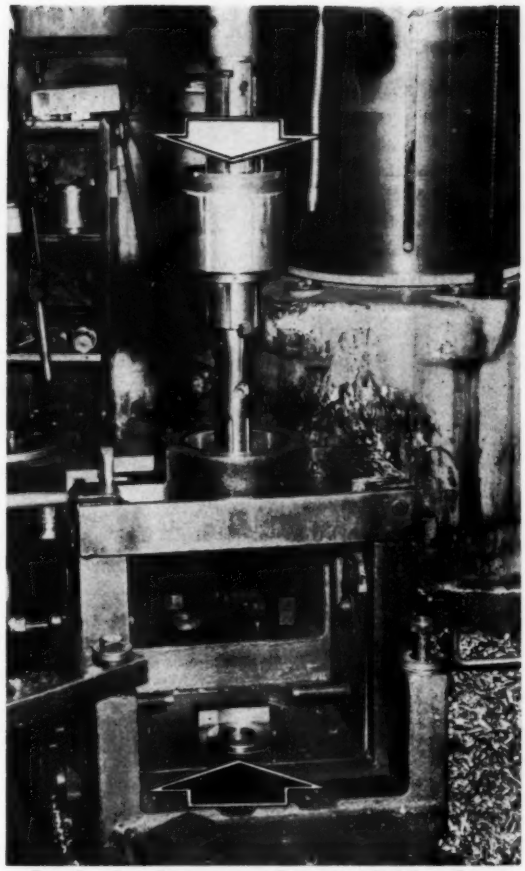


Fig. 4. Installation on a Cincinnati Bickford Super Service radial drill at Owen Bucket Company. When boring and counterboring steel castings, improved performance gave estimated savings of $36/part.

Performance: Report that the increased arbor rigidity saved time and money by eliminating chipping of carbide inserts. Accuracy and finish greatly improved. Cutter life increased. Cost of replacing and maintaining two bronze bushings/yr eliminated. No maintenance required on the Jergens bushing after 17 months of constant operation.

The Jeffrey Manufacturing Company, Columbus, Ohio

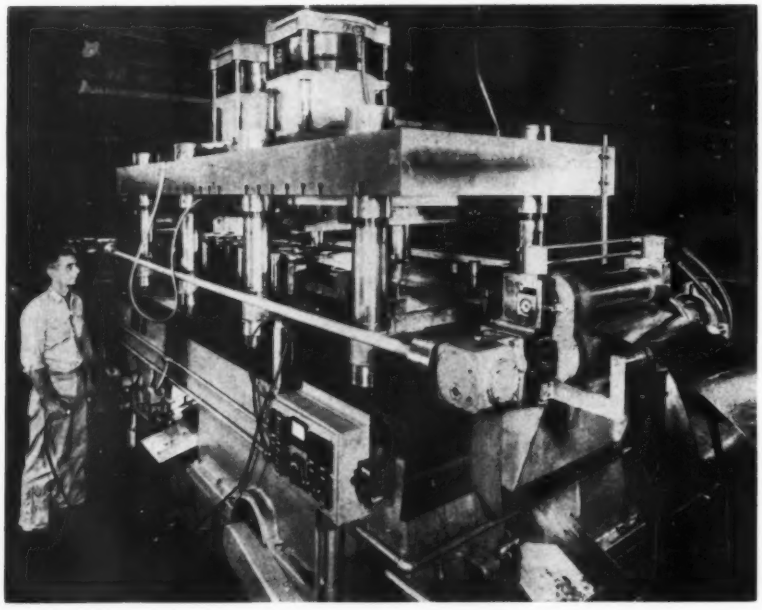
Job: General milling on a variation of alloy steel castings and forgings.

Application: Installed Jergens milling machine bushings to replace bronze bushings on outer support of two Kearney & Trecker and one Cincinnati milling machines.

Performance: The installation gave greater arbor rigidity resulting in minimum maintenance, elimination of twisted arbors, frozen bushings, and chatter. They have had no breakage of cutters and are realizing greater cutter life per grind. In addition, there is less load on clutches and motors and five hrs/month/machine of maintenance have been eliminated.

end

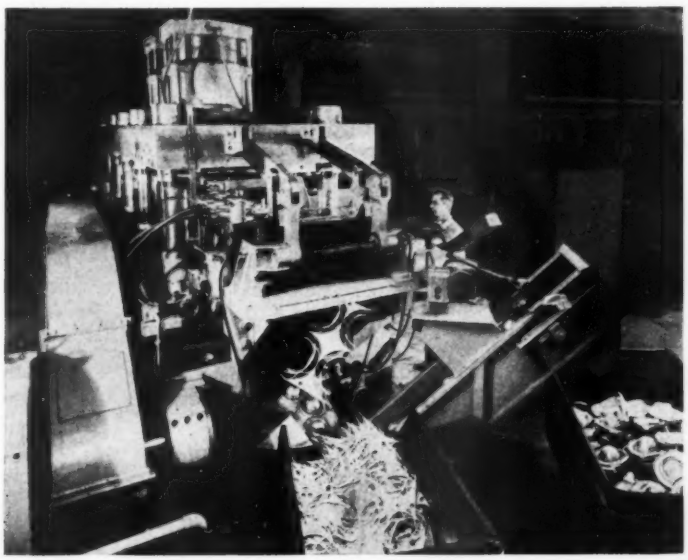
Big Press Forms 2,000 Headlamp Shells/Hr



Deep drawn shells for new dual headlamps being produced on C. M. Hall Lamp Co.'s new 450-ton automatic press. The press here is in up position, with stock advancing along progressive die stations.

TWO THOUSAND AUTO HEADLAMP shells are formed from strip steel every hour on the new 450-ton automatic press recently installed by C. M. Hall Lamp Co. The largest of its type, reports company President Harry D. Hirsch, the Brandes press is being used to stamp out double units for new-style dual headlighting. It is doing this faster than single units were previously made. Shells for the dual lamps formerly were formed on a bank of single-station presses at a rate of about 500 pcs/hr. Capacity of the new press is twice the total of the six older ones it is replacing. The 450-ton pressure rating — 150 tons more than that of the largest similar automatic presses previously built — is required by the severity of draw and the unusual size of the progressive dies the press is designed to handle — up to 36″ x 170″.

end



Stampings for dual headlamp shells flow from the 450-ton automatic press. Lower chute delivers stampings into conveyor, while cuttings are ejected from above.

THERE ARE ABUSES . . . AND *ABUSES*

In last month's TOOLING & PRODUCTION feature on industrial diamonds, we said "Abuse . . . Not Use . . . Wears Diamonds Most." Now we say "Abuse . . . Wears Patience Most," for we erred royally by abusing our own verifying and checking procedures, and mixed the illustrations and captions on page 77.

Sincere apologies to our readers and to Wheel Trueing Tool Company, who photographed these diamond tools to illustrate "rights" and "wrongs" of trueing practices.

◆

Compare the corrected sequence of diamond trueing tools at the right with those you are using. It may help you spot costly abusive practices going on — at your expense — in your plant.

The first two show 1) a new octahedron diamond mounted and ready for use, and 2) a properly used diamond tool ready for removal from its shank and re-setting. Periodic turning of the tool assured even wear on all sides of the diamond, and although it is worn and smaller than when new, it can be re-set for many more trueing hours.

The other four illustrations show the major causes of diamond loss; the results of the major abuses committed by users. Here is where plant diamond costs rise unnecessarily, Wheel Trueing Tool Company's D. J. Wallace points out. The results of using a diamond trueing tool straight into the wheel, of side-swiping, of leaving the tool in one position too long, and of over-heating are enlarged for comparison purposes.

If you file your copies of TOOLING & PRODUCTION, clip this corrected page and insert it into the February article on diamonds. First, though, show the illustrations to your trueing tool users so they can learn to recognize the common abuses of the tools they use . . . and so they can correct their methods before damaging abuse occurs.

◆

$1,000,000-Worth of Diamonds. The Industrial Diamond Association of America will cover all phases of the industrial diamond's contribution to tooling at the forthcoming ASTE Tool Show in Philadelphia. Starting point will be a million dollars worth of diamonds, as found in nature, as made into tools, and as made into various other end-products. An information section filled with data sheets and other technical publications on diamonds will complete the display.

Fig. 15. A new octahedron diamond mounted in a steel shank and ready for abrasive wheel trueing and dressing operations.

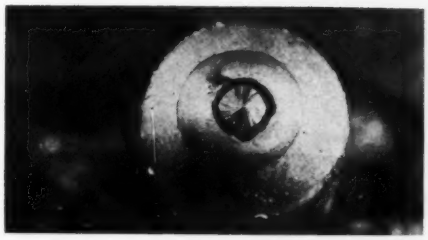


Fig. 16. A properly turned diamond tool has uniform sharp cutting ribs, developed during use by turning the tool frequently. The diamond can be reset and used for many more operations.

Fig. 17. Using a diamond trueing tool straight into the wheel, without drag angle, fractures the diamond. A 10°-15° drag angle is recommended.

Fig. 18. Side-swiping — starting the diamond into the edge of the grinding wheel each time the diamond is turned — is another major abuse. Correct dressing should have started at the high point on the face of the wheel.

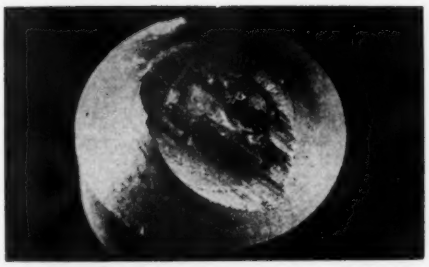


Fig. 19. This abused tool was left in one position too long, resulting in diamond-fracturing heat.

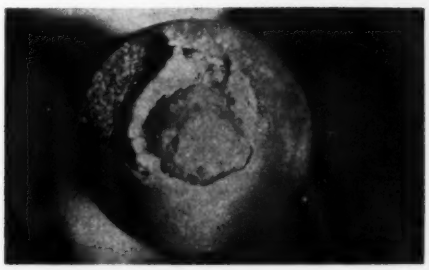


Fig. 20. Heat caused the metal holding the diamond to melt. Such excessive heat probably has affected the hardness of the entire diamond.

Photos courtesy Wheel Trueing Tool Co.

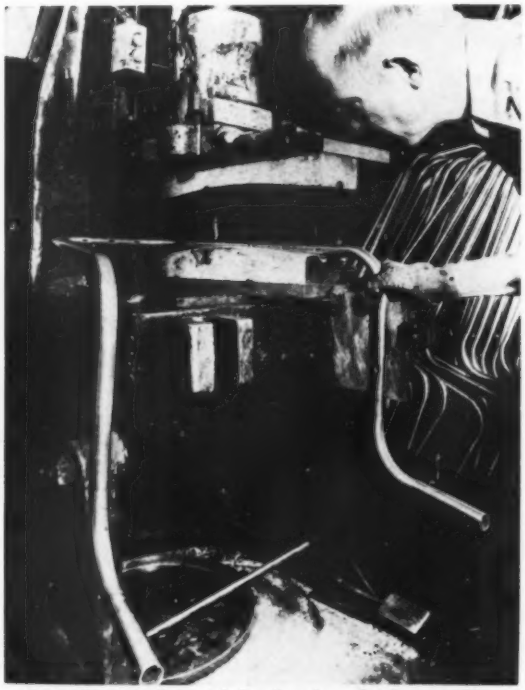
Arvin Plans for

INCREASED USE OF PLASTIC TOOLING

Company-wide campaign paves the way, and trained supervisors look out for possible uses in light fabricating.

THE TREND TOWARD USING PLASTIC TOOLING and plastic prototypes is spreading to the light metal fabricating industries as they too feel the pinch of rising tool costs, sharpening competition, and the necessity for constant redesign.

A cautious company-wide investigation of plastic tooling was begun two years ago at Arvin Industries, Inc. The program they evolved with the cooperation of Detroit consultant Appy Juras, spells out a smart policy toward plastic tooling. It calls for use of plastics wherever possible, and includes a comprehensive training setup that eventually will lead to nearly complete independence in plastic tooling choice and use for the managers, superintendents, and toolrooms of the company's three divisions.



A production die used for forming aluminum tubing for an Arvin outdoor furniture making division is a laminate of epoxy tooling compound and glass fibers. The die has virtually no abrasive action so there is no need for additional finishing for the parts.

In their type of business, Juras pointed out to Arvin management, so much emphasis is placed on styling that companies unable to withstand the tool costs, which are part of product styling, go out of business. The company in a position to stand the tool costs because they are able to amortize their cost over a greater volume of production, takes leadership in the field. With plastic tooling used wherever feasible, Juras concluded in his report to Arvin, total tooling costs can be kept more comparable with the amount of production to the run.

Arvin was convinced that the success of the plastic tooling technique depends on education and proper training, so the company's training program was set up. Toolmakers from each division were first to take a 10-week course. They studied plastic tooling theory, nomenclature, materials, and techniques. Special emphasis was placed on casting and laminating epoxy resins, use of plaster for models and molds, and construction of tool structures with fiberglass tubing, steel tubing, and plastic base plaster. Work projects included making actual plastic tools, gages, and fixtures.

These people form the nucleus of the training force destined to introduce plastic tooling techniques to toolroom personnel in each of Arvin's plants. To make sure they would be accepted and to pave the way for a decentralized but widespread acceptance of plastic tooling, however, the company set aside two days of the original 10-week training session to discuss the subject with plant managers and engineering department heads. They were familiarized with the history of plastic die use, and fabricating techniques, so they too would appreciate the role of plastic tooling and use plastics where feasible.

The over-all objective of the program was to equip all of the company's toolrooms to make plastic dies and models and to provide their personnel with the knowledge of how and when to use plastics most efficiently and economically.

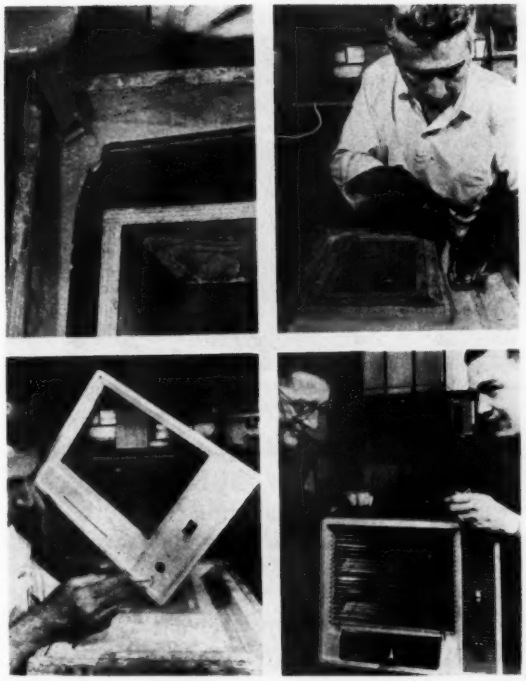
To make a sample heater part, liquid epoxy compound is poured around a wood model . . .

Glass cloth reinforcing of the plastic gives extra backing and strength . . .

The stamped face of the heater containing the opening for controls is removed from the form . . .

Completed prototype heater with metal grill is ready for the sales force to use in the field.

Photos courtesy Bakelite Company



Immediate results, Arvin's assistant education director, W. R. Kautz, reports, were in fabricating lightweight assembly fixtures and holding fixtures, some small high production tube bending dies, models and mockups for the Radio-Electric Housewares division, and low production prototype dies. Now the company is using glass reinforced epoxy forming dies in production operations, and glass reinforced jigs and fixtures for quality control purposes. They are expanding their use of epoxy plastics for prototype model making.

Use of these plastic compounds has provided drastic reductions in both costs and time, Arvin points out. Close tolerances can be held in fabrication, and plastics' dimensional stability is maintained throughout the life of the tool. The lightweight plastic tools, in addition, are easy to handle and eliminate a considerable amount of worker fatigue.

Arvin realizes that plastics are not suited for all jobs, but engineers there believe that with careful selection, costs can be cut and delivery time improved. Right now they are concentrating on the use development of high speed, long run production dies.

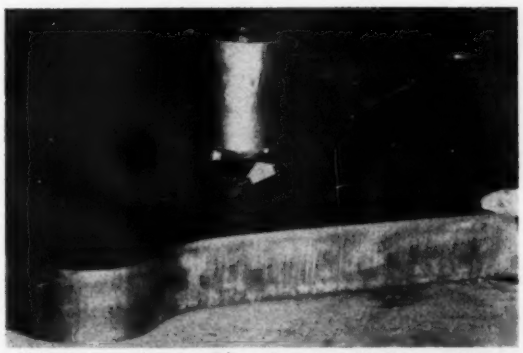
end

CO_2 Welding Improves and Speeds Up Die Set Construction

RELIABILITY OF COMPONENTS going into the makeup of an expensive long run production die is expected by the purchaser, but if a part should fail he stands to lose on his investment, both from a cost and lost-time standpoint. The chances are that the supplier will not be considered when the manufacturer's next job comes up. Die set manufacturers are well aware of these facts.

Since the die set is the very foundation of every die, it is obviously one place where cutting corners can not be gotten away with for long. One point in particular is found in the joint between shank and punch holder. On all but the larger draw and blanking dies, the shank is all that holds the upper half of the die in the press.

When a hole through the shank is required, for a parts knockout or other purpose, the shank is always welded. This weld must be strong enough to hold up under the heavy, continuous shock loads encountered in a punch



Shank is undercut 45° and tack-welded in position on punch holder by semi-automatic welding gun.

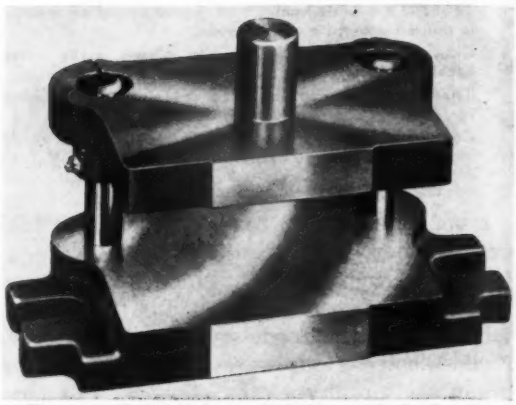
Finished weld shows uniform, good-looking bead. CO_2 process also eliminates slag and spatter.

press operation. And it has to hold up for a long time since the die may be used to produce parts numbering in the millions.

Extremely close attention had always been paid to this critical part of the manufacturing process by the Detroit Die Set Corporation. Shanks were carefully welded in position by hand, using conventional arc welding methods. Recently this operation came under fire because the time spent in getting dependable welded shanks was bottlenecking the output of the plant. Production engineers investigated both flash and resistance welding, which appeared to be the answer to increased speed.

However, when holes were bored through the shanks, ⅓ to ½ of the flash weld was removed. Joints were not always satisfactory. A machine large enough to satisfactorily flash weld a 2″ or 3″ dia shank to a punch holder of the same thickness was not practical from a cost standpoint.

CO_2 welding was suggested since there are automatic and semi-automatic types of equipment available for this kind of work. When Detroit Die Set tried it, better results were



Close-up of finished punch holder and shank after machining to sharp 90° angle between the two. Surfaces of die set are also ground parallel and square with each other.

immediate. Welding speed alone was increased 300% over the previous methods. General Electric Fillerarc equipment was selected and is providing speeds comparable with automatic welding and still retaining the versatility of hand welding.

Strength of the welded joints was increased. Pull tests at a leading testing laboratory gave no visible indication of failure even when the maximum capacity of the machine was reached (150,000 psi). Previously, it had been possible to assign a tensile strength to the welds well below that figure. This increase in strength is attributed to the deep penetration without porosity provided by the CO_2 process. When a hole is machined through the shank, only the unwelded center portion is removed, leaving a much stronger joint than could be provided with resistance welding.

All die sets with welded shanks now produced by Detroit Die Set are CO_2 welded. This includes both cast and fabricated die sets in standard or special models.

end

Welding the shank to punch holder. Continuously rotating table and General Electric Fillerarc equipment provide smooth, sure weld every time.

How to Cut Your Bearing Inventory

by John Cunin
BEARINGS, INC.
Cleveland, Ohio

A CONTINUAL INCREASE IN COMPLEXITY of the equipment within our plants emphasizes the necessity of an increase in effort to keep it running. Downtime means lost production which is measured in dollars lost. Any dollar loss may indicate the need for greater efficiency through an improved bearing inventory. A machine being inoperative for want of the proper bearing can easily become a thing of the past if you simplify your inventory. Also, money will not be tied up without benefit.

A plant manager's production depends on equipment, such as motors. Even where preventive maintenance is not practiced, at least there is an awareness of the need for bearing replacement, and extra bearings are stocked.

Bearings are usually stocked by the part number of the company that manufactures the motor; these numbers are seldom standard bearing numbers. So if four motors are involved, all from different manufacturers, "stores" would probably stock bearings for these motors under four different numbers (four separate places); even though these bearings might all carry the same specifications and be identical. If your equipment is extensive, and if your replacement stock is kept up to date, there can be a tremendous overage of expensive bearings laying around on your shelves. Should your equipment be large, requiring large bearings, the capital tie-up can be shocking—many bearings run about $500.00 apiece.

If you are aware of these possibilities, you can easily see the evil of duplication and take steps to correct the practice. But it's one of those things that could, and does, go on for years undetected.

As a service, your bearing distributor will go over your entire bearing picture and give you standard bearing numbers in place of the manufacturers' part numbers and make other helpful suggestions.

His suggestions will depend on the system you are using at the present. Usually your bearing problems can be resolved with minor changes. For instance: if you are using a single card system, a bearing is probably traced with a manufacturer's parts list number to a card carrying these numbers arranged numerically. On this card you will be directed to bin number so-and-so where the bearing is stored. For every manufacturer's part number there will be a card and for every card there will be bin space; but, due to the sameness of many bearings, they could share the same bin space. See Figure 1. A bearing engineer can consolidate your bin space by placing all bearings that are alike together. Like bearings may be from the same manufacturer or have the same specifications and be from different manufacturers. This is not to suggest that you use only one make of bearing, but to suggest that you don't stock the same bearing in a number of different places.

HAND TOOLS – BEARINGS

TOOL	MFG. PART #	ST'D #	BIN
A	6243795	209K	12
B	394524	2095K	12
C	958AF	3209NO	12
D	18459A	M-5307	27

Fig. 1. Single stock card system.

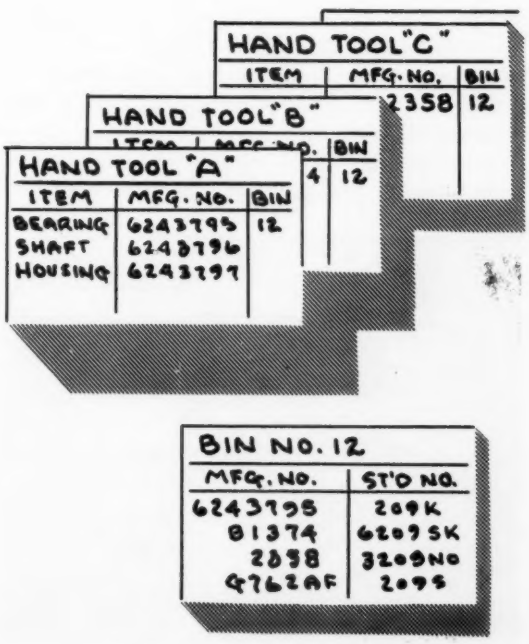


Fig. 2. Double stock card system.

Another method of recording that is a big help, when taking a quick inventory, is the two card system. See Figure 2. Here the first card carrying the tool name and the manufacturer's part number will lead you to a second card carrying standard bearing numbers of all-alike bearings. The second card lists everything in the bin it represents.

If your operation is modest, and you don't stock replacement parts, the marking-in by your distributor of standard bearing numbers on the manufacturer's parts list will be a quick replacement aid. Many times you will want to order a bearing before you "tear down"; in this case you would not have the standard bearing number since it is stamped on the still assembled bearing.

From these systems you will be able to simplify your records, weed out your duplicates, and put extra money to work.

And while your bearing situation is being brought up to date, by improved stocking methods, your distributor will, at your say so, "pull" all of the bearings that have been opened and not used, and those that have been on the shelves for a long time; dirt and solidified grease can be removed and they can be rewrapped.

Also as an added service he will be glad to stock for you all, or part, of your bearing inventory. The chances are that he stocks 90% of the bearings you now use and will immediately inventory the other 10% on your say so.

end

Improve Bearing Life by Careful Installation

Inspection of a shaft journal, before it receives a bearing, is important. New or old, a shaft should have round journals; the rough edges should be smoothed; and shafts having areas that are worn should be repaired or discarded. See Figure 1.

The cause of bearing failure cannot always be pinned down, but we do know that the foremost enemy of a bearing is dirt. Don't leave bearings laying around on the workbench waiting to be assembled. Keep them wrapped and in their shipping boxes. See Figure 2.

The original lubricant should not be washed from bearings. It is a high grade protective coating as well as a lubricant, and cannot be applied in the field as thoroughly as it was during manufacture.

It is recommended that you use a soft malleable hammer and pipe for assembling a bearing to a shaft, if an arbor press is not available. Other materials which might be used for hammers or buffers between the hammer and the bearing will more readily shatter and create chips that might fall into the bearing.

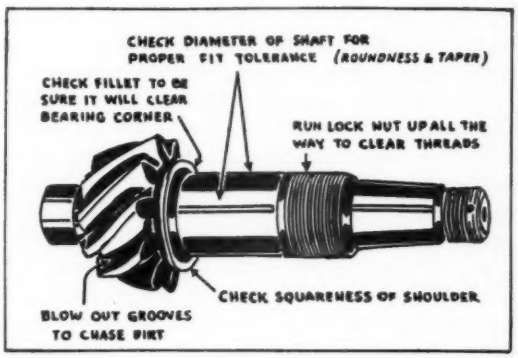

CHECK DIAMETER OF SHAFT FOR PROPER FIT TOLERANCE (ROUNDNESS & TAPER)
CHECK FILLET TO BE SURE IT WILL CLEAR BEARING CORNER
RUN LOCK NUT UP ALL THE WAY TO CLEAR THREADS
CHECK SQUARENESS OF SHOULDER
BLOW OUT GROOVES TO CHASE DIRT

Figure 1.

If a pipe is used for the assembly of the bearing, do not allow it to rest on the outer race while hammering or forcing the bearing on the shaft. Hold the pipe so that the face contacting the bearing is as square as possible with the axis of the bearing.

When assembling bearings by the shrink-fit method, it is important that the air used for expanding the bearing does not exceed 200°F. Higher temperatures will endanger the hardness of the bearing. A good way of "soaking" a bearing is to put it in an electric roaster of the kitchen variety, which represents a modest outlay for controlled heat.

After slipping a pre-heated bearing on a journal, it should be held in the desired location until cooling has permitted a seizing of the shaft. Movement of the bearing after seizing cannot be done without scoring the shaft.

Figure 2.

Courtesy of Bearings, Inc.

end

Contour Projection for

HIGH SPEED PRODUCTION OF MERCURY SWITCHES

THE NEW BUT NOW-FAMILIAR decorative Honeywell Round thermostat might have been manufactured sooner but wasn't — the mercury switch which forms its heart and brains couldn't have been made accurately enough or in large enough quantities as recently as 5 years ago.

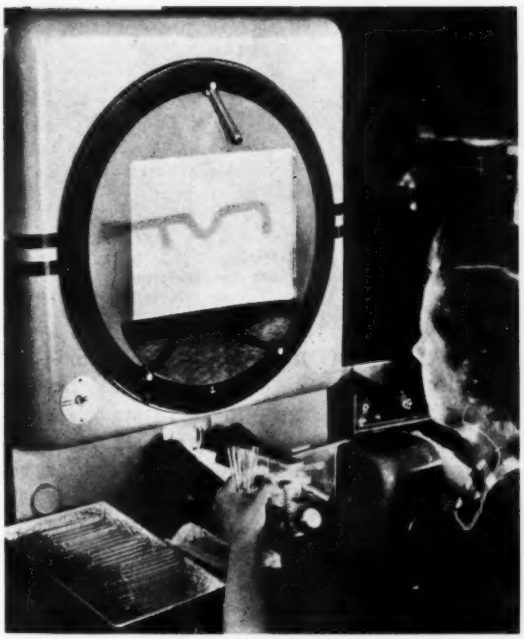
The new Honeywell Round functions with a coiled bi-metal in place of the conventional compound bar. As the coil tightens with the cooling of the room, the glass-encased mercury switch is tilted until a drop of liquid mercury bridges the gap between two delicately set electrodes. This sets up the passage of current which starts the furnace.

Glass encased and vacuum sealed, the mercury switch is immune to dust and dirt. It is also silent in its operation; it does not wear out.

Even though mercury switches are better devices for many electrical applications, until recently their production has been more an art than a manufacturing process. In some parts of the world, the making of a mercury switch still calls for individual blowing and forming of glass containers and delicate, microscopic adjustment of component parts.

High speed production of mercury switches has been pioneered at Honeywell's Micro Switch Division, located at Freeport, Illinois. Using equipment developed especially for mercury switch manufacturing, this plant is able to turn out the precision electrical devices at rates approaching a thousand an hour.

Major key to such mass production has been the series of automatic glass working devices: 1) The first machine is a thermal, crack-off cutter which divides tubes of glass into proper lengths for switch manufacture. The glass sections are then slipped over jigs in which the switch's precision formed electrodes have been set. 2) The second machine pinch-seals the glass around the electrodes, embedding them in approximate operating positions. 3) Another automatic machine constricts the glass, preparing it for final processing. At this point, progress is inspected on a polarascope. Viewing the tips of the newly formed tubes through a microscope under polarized light shows up any stresses or hard spots in the glass so that production can be corrected.



Magnified 20 times in the form of a clearly visible image, the adjustment of a mercury switch electrode is a high speed job for operators using Kodak Contour Projectors.

Since the mercury is the only salvageable material in a mercury switch, it is imperative that any deviation in process be caught immediately.

Final unit among Micro Switch's new glass processing equipment is a device which, in a series of operations, evacuates the switch, fills it with hydrogen, drops in a quantity of mercury automatically weighed to a thousandth of a gram, and then seals the switch. Aside from the polarascope inspections, there is only one major operation which is still done manually. This is the adjustment of the electrodes so that they will be in the proper positions to establish contact with the mercury as specified.

The embedding of the electrodes in the glass, of course, is not a precision operation. The actual settings must be done by manipulating the wire electrodes with specially designed

Another contour projector, installed in Micro Switch's tooling department checks configuration of mercury switch electrodes before they are released for assembly.

tools. However, tolerances on electrode adjustments are too fine for work to be done with the naked eye. On the mercury switch which goes into the Honeywell Round thermostat, for example, distances between the tips of the electrodes must be accurate to within 0.002". Furthermore, the angle to which the electrodes are adjusted must check out to between 24 and 72 minutes of arc.

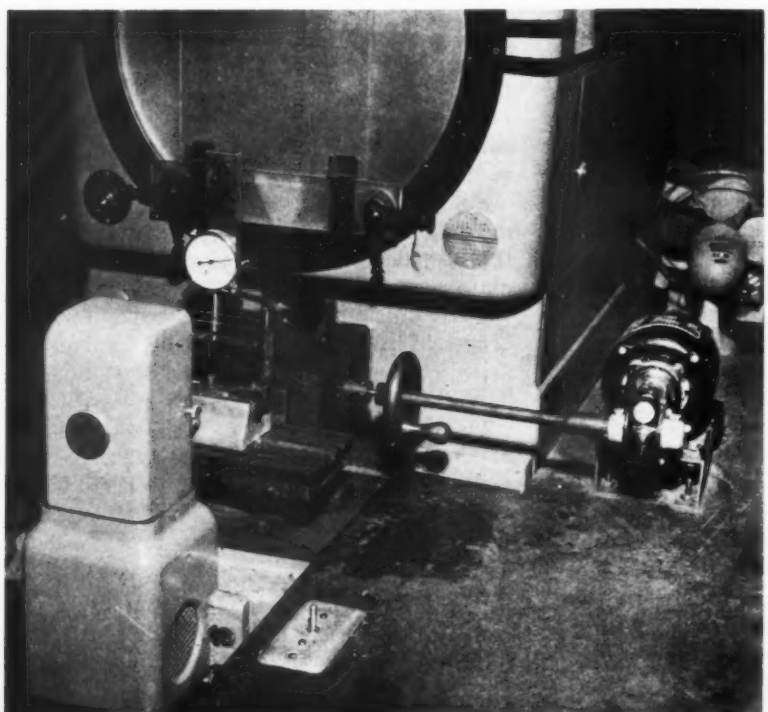
This manual adjustment of electrodes is done on a battery of seven Kodak contour projectors, to keep pace with the high production rate of the automatic machinery. In making these adjustments girls place the switches into a fixture on the projector's work stage. A beam of light passing over the switch throws a precisely magnified image of the part on a ground glass screen. A chart made up with this magnification (20X) is mounted in front of the projector's screen for guidance of the operators in making the adjustments.

Thus, an adjustment which cannot even be seen with the naked eye becomes an easy visual process with the aid of this precision optical instrument.

Two other contour projectors have been set up to inspect the adjusted electrodes before the switches go back into the production cycle. Working with projectors which have had their elevating stages motorized for this specialized use, inspectors check out distances between tips and the angles at which the electrodes are set.

As Micro Switch engineers have worked it out, the electrode adjustment is the only non-mechanical step in mercury switch production. And to this operation has been applied precision gaging that removes any potential bottleneck, while ensuring high accuracy of workmanship.

end



This photo illustrates the simple method used at Micro Switch for motorizing the work stage of a Kodak contour projector. Inspection of the switches used to require 90 turns of the manual lever. Motorizing the stage has made it possible to triple production on this job.

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THE CINCINNATI MILLING MACHINE CO.
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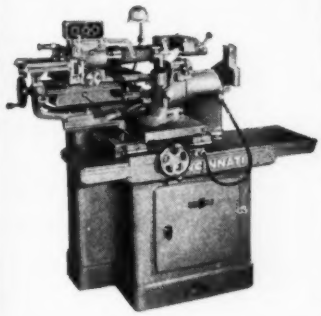

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CIRCLE INFORM-A-GRAM KEY NO. 77

High Production Special Stud Driving Machines Formed from Standard Units

Multiple-Stud Patterns Can Be Economically Produced with One Setting Regardless of Production Lot Size

by John Glass
Chief Engineer
STUDRIVE INCORPORATED
Detroit, Michigan

THE EXTENSIVE USE that has been made of studs as fasteners on die cast parts necessitated the development of high production machines for fastening them. These machines in the past have been designed to drive the studs into a particular casting; and, when that casting was redesigned, it was necessary to scrap the existing machine and to design and build a new one which was capable of handling the redesigned piece.

In order to eliminate the waste of time and money which resulted from this replacement, a standard unit for driving a single stud has been developed. This unit is capable of being grouped with similar ones in order to form a complete, special stud driving machine for a specific use. When the workpiece design is changed, or a completely new one is to be used, the standard units may be easily regrouped to meet the requirements of the changed operation.

In addition to the special features which allow the units to be grouped to drive studs on very close centers and to operate off universal pneumatic power systems, these units also incorporate a lead screw for feeding the stud into the casting. This eliminates the rejection of parts because of stripped female threads.

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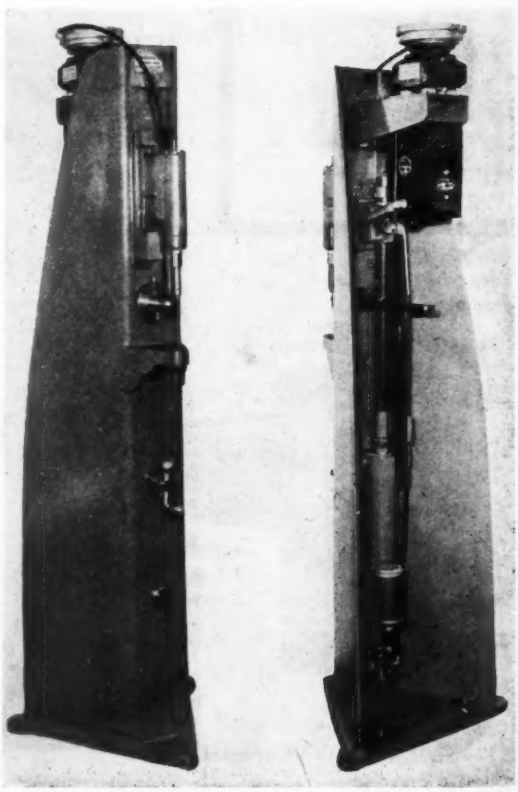
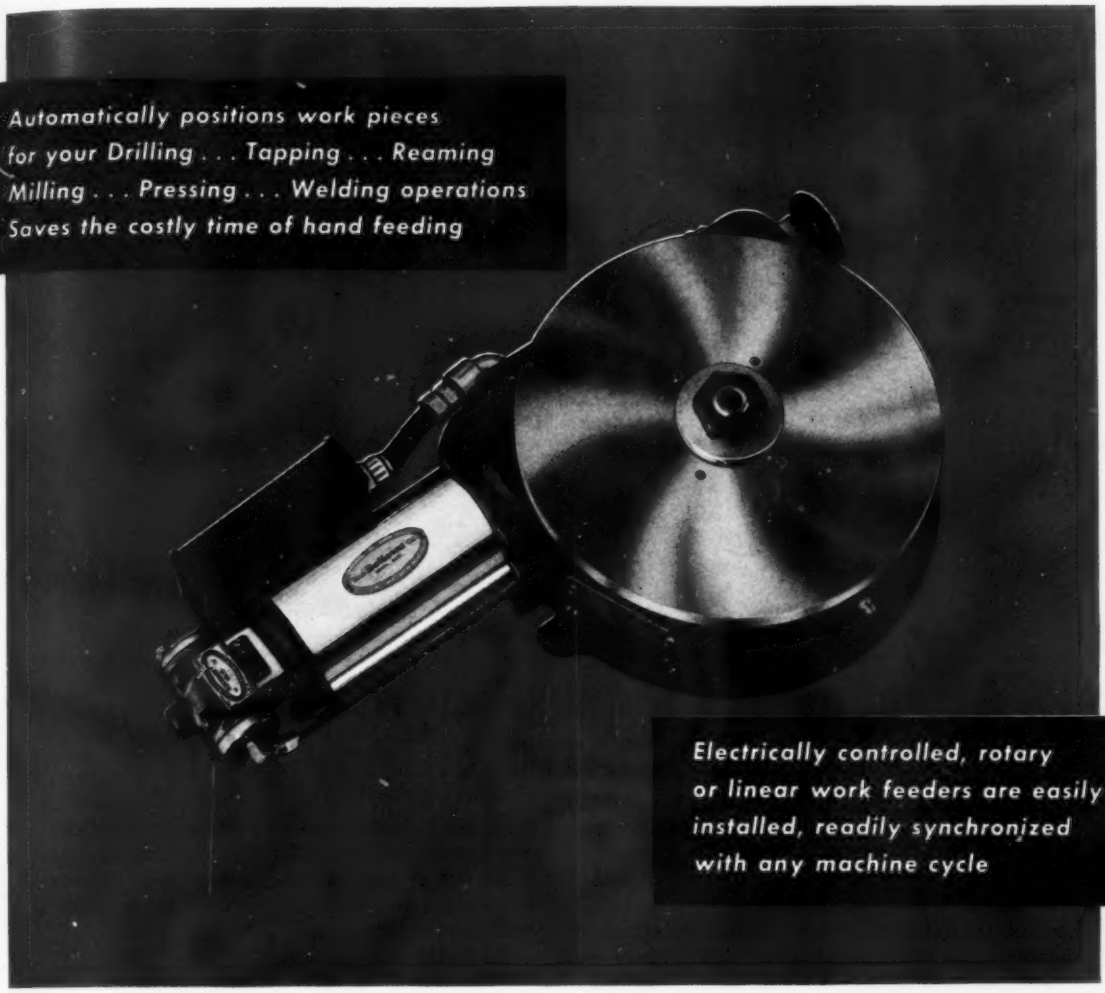


Fig. 1. Front and rear view of standard stud driving machine unit. Notice automatic feeding hopper for studs.


Automatically positions work pieces
for your Drilling . . . Tapping . . . Reaming
Milling . . . Pressing . . . Welding operations
Saves the costly time of hand feeding
Electrically controlled, rotary
or linear work feeders are easily
installed, readily synchronized
with any machine cycle

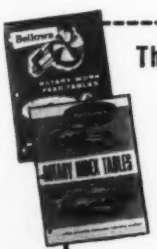
QUALITY CONTROL CAN BEGIN AT THE POINT-OF-OPERATION WHEN YOU FEED PARTS WITH BELLOWS WORK FEEDERS

You will have many more acceptable parts at Final Inspection if you examine work pieces at the point-of-operation. To give machine operators time for visual inspection, feed parts to tools with Bellows Work Feeders. The operator will then have time to load at one station, unload and examine a finished part while his machine continues to work. Not only will there be time for examination of the machined part but you will be able to use more of the machine's producing ability. The tool won't be standing idle while the operator loads and unloads.

Bellows Work Feeders are made in both rotary and linear type models; different units designed for high speed parts positioning where tolerances are not critical, or precision indexing types where close accuracy is required.

Air-Powered, electrically controlled, they are easily installed on standard machine tools, can be readily synchronized to work with the basic machine cycle.

To cut machining costs . . . keep the machine working while you load or unload a fixture.



These Bulletins give you the Facts

Write for Bulletins RT 1022 and RT 1326 for full specifications and application data on Bellows Work Feeders. Address Dept. TP-358. The Bellows Co., Akron 9, Ohio. In Canada, Bellows Pneumatic Devices of Canada, Ltd., Toronto 18, Ontario.

The Bellows Co.

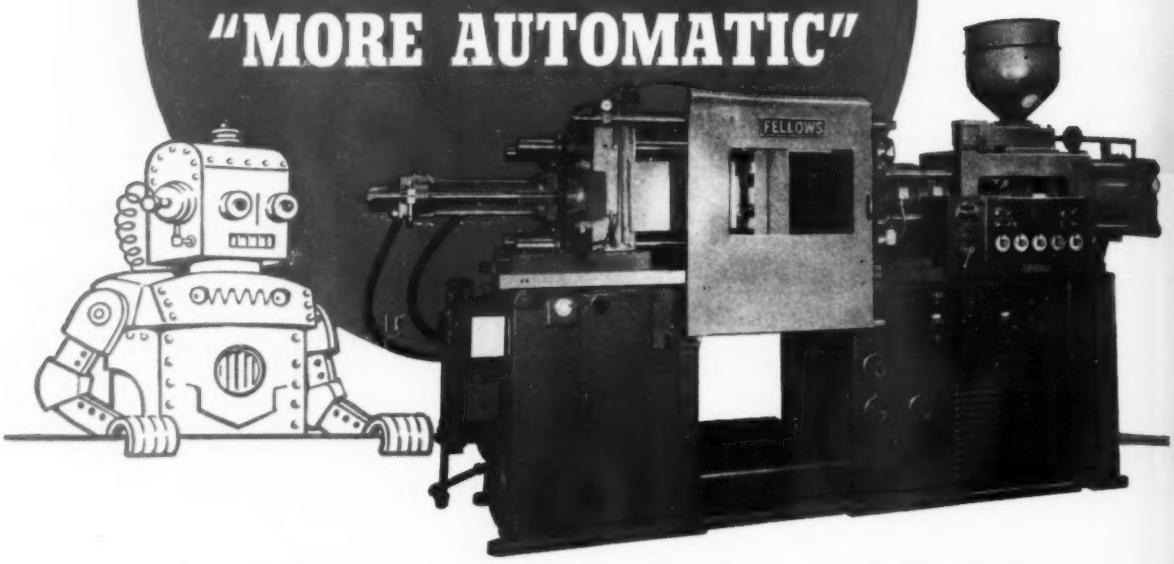
DIVISION INTERNATIONAL BASIC ECONOMY CORPORATION

AKRON 9, OHIO

1030-B

CIRCLE INFORM-A-GRAM KEY NO. 79

How you can make it "MORE AUTOMATIC"



Attachments Make Fellows "6-200" FULL-AUTOMATIC on Any Job!

Automatic molding pays off in increased production, improved quality of product and lower production costs. The Fellows 6-200 was designed for automatic molding — either partial or full. Its basic design was so planned that the attachments necessary to accomplish the desired degree of automatic operation can easily be incorporated in the machine.

Solving production problems in the molding of containers, closures, cams and a wide variety of consumer and industrial products having internal and external threads, undercuts and side cores brought about the development of a range of attachments which can readily be added to the Fellows 6-200 according to your job requirements. Look over the list — ask for further information on the machine. See for yourself how you can save money by using a Fellows 6-200 Injection Molding Machine, the fastest and most versatile automatic in its capacity range.

Versatile *Fellows Plans* provide convenient short or long-term financing, let your machine pay for itself out of extra earnings. Ask your Fellows representative for the facts. Just get in touch with any Fellows office.

OPTIONAL SPECIAL ATTACHMENTS

- Prepack and pre-position
- Low pressure mold closing protection
- Dual hydraulic knock-out mechanism
- Front knock-out device
- Press stroke interruption and control
- Press speed control
- Air sweeps for article and runner removal
- Multi-nozzle set-ups
- Extra power packs for high-speed injection
- Power take-off for side-action cores or unscrewing
- Conventional air ejection
- Special press control for insert molding

Fellows

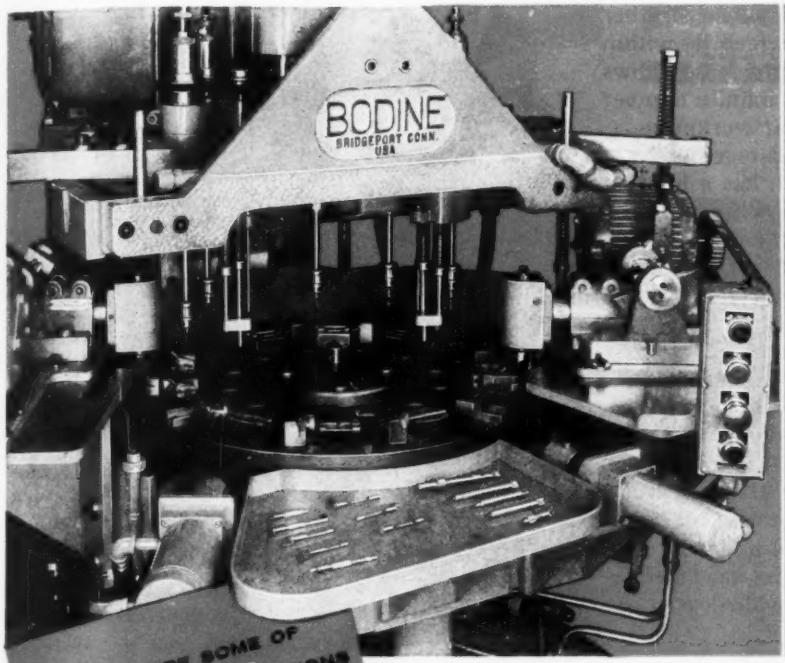
injection molding equipment

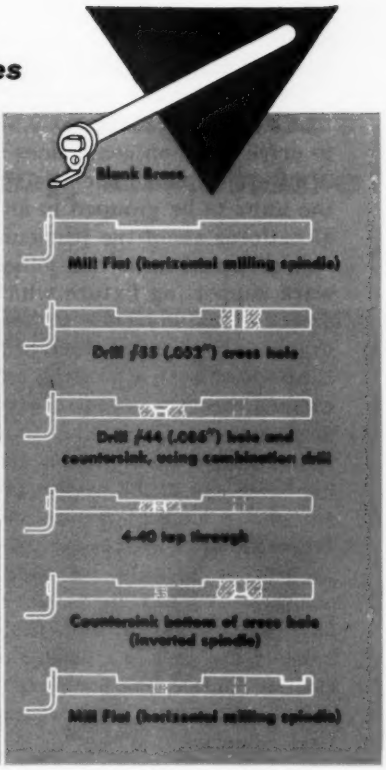
THE FELLOWS GEAR SHAPER COMPANY, Plastics Machine Division, Head Office and Export Department: Springfield, Vermont
Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich. • 150 West Pleasant Ave., Maywood, N. J. • 5835 West North Ave., Chicago 39
6214 West Manchester Avenue, Los Angeles 45

CIRCLE INFORM-A-GRAM KEY NO. 80

Bodine case history no. 47

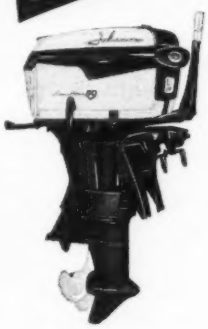
Johnson Sea-Horse throttle shaft in 14 varieties




Blank Brass
Mill Flat (horizontal milling spindle)
Drill #55 (.052") cross hole
Drill #44 (.086") hole and countersink, using combination drill
4-40 tap through
Countersink bottom of cross hole (inverted spindle)
Mill Flat (horizontal milling spindle)

THESE ARE SOME OF THE MANY PART VARIATIONS HANDLED ON BASIC SET-UP

unique BODINE combination tooling like this is part of the "Sea-Horse" saga



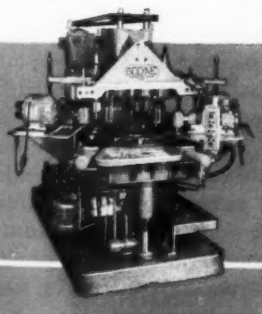
For years Bodine machines and methods have been helping Johnson produce intricate outboard motor parts to high precision standards . . . and within equally close cost limits.

This unusual combination tooling for drilling, tapping and horizontal milling operations is the latest example. No less than 14 variations of these brass throttle, choke and shift parts can be produced on this one machine with fast and simple change-over.

Note the tough holding problem, with holes and flats to be accurately located relative to a crank arm. Note, too, how Bodine swiveling milling heads permit required changes in both width and location of slots. Ready accessibility of tools, indexing table, etc., is obvious. The figures below complete this interesting story . . . and the chances are that Bodine can work out an equally practical and efficient approach to YOUR problem. For further information, write Dept. TP-3.

production data: 550 pieces per 50 min./hr., operating at 11 strokes per minute with manual load and unload.

SBD57



This tooling uses the basic Bodine 42-30 Machine with standardized spindles and horizontal milling attachments. Note how compact this production unit is, requiring only 7' x 8' of floor space.

THE Bodine CORPORATION
BRIDGEPORT 5, CONNECTICUT

AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

CIRCLE INFORM-A-GRAM KEY NO. 81

. . . Stud Driving from page 78

Each of the units stands on its own pedestal which supports the driving head at working height. The base is triangular in shape and the centerline of the driving head lies within 1″ of the forward vertex of the triangle, so that a number of units may be joined together to drive studs on centerlines which lie within 2″ of each other. The triangular base allows the units to be grouped in an infinite number of patterns about the particular workpiece.

A group of units are joined together by a work supporting fixture which has a locating dowel on its underside in line with each stud that is to be driven. Each of the driving units is provided with a locating hole on an upright surface directly below the centerline of the driving head. Thus, when the locating dowels in the fixture are aligned in the units, the driving heads are in the correct position independent of the angular position of the unit base. When the units are reassembled into a changed pattern, it is only necessary to provide a changed work holding fixture. The dowels and fixture are lined up with the various locating holes in the unit in a matter of minutes. One electric control line connects the machines together and a new "special machine" is ready for production.

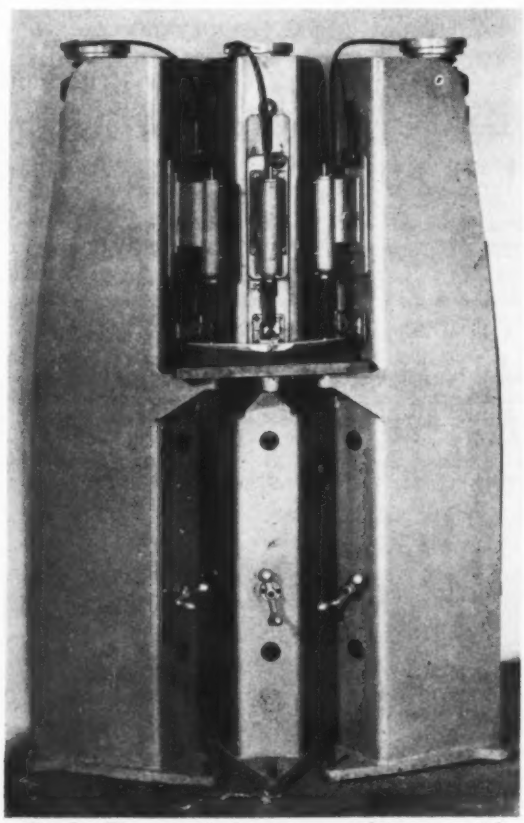


Fig. 2. Three standard units arranged into a special stud driving machine.

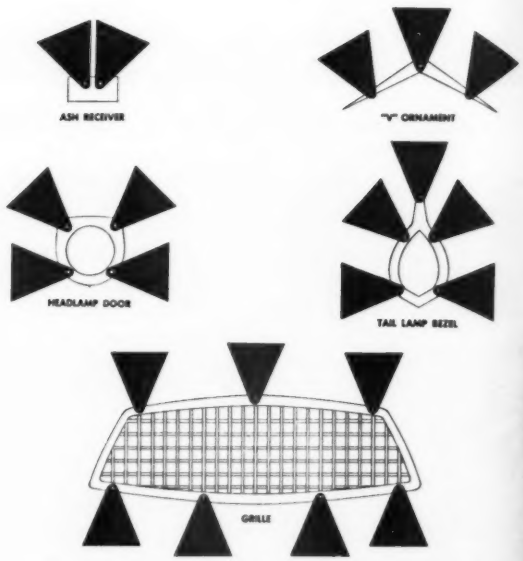
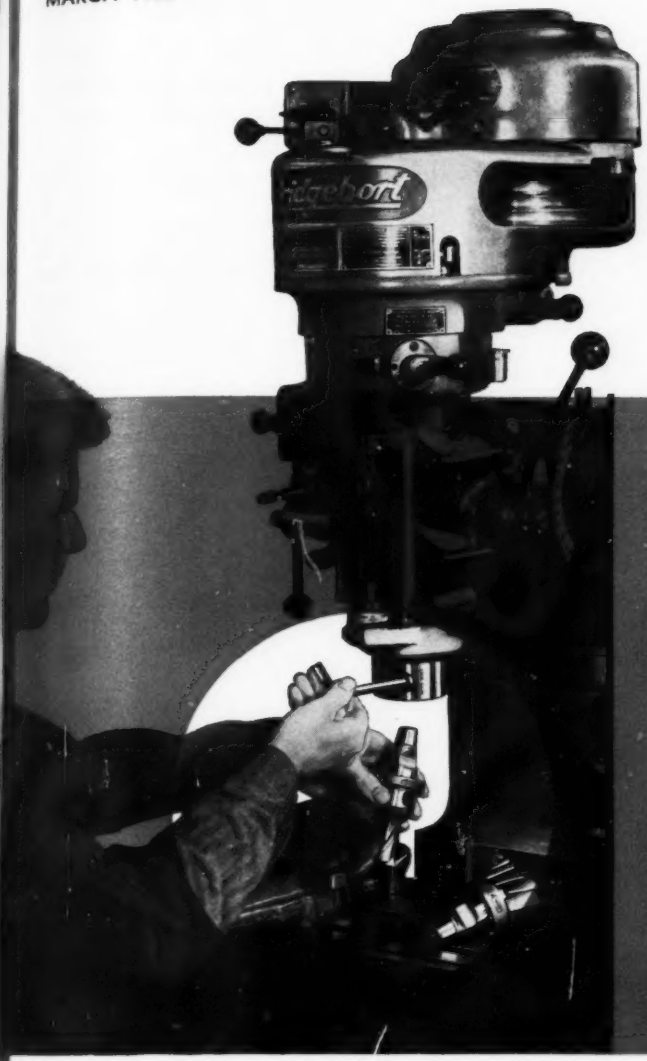


Fig. 3. Compact, triangular base design of machine permits units to be used in multiple for an infinite number of stud patterns, a few typical ones being shown here.

The units are powered from a standard 80 psi air line, and when the electrically controlled air valve is actuated, a rack carried on a cylinder rod causes a pinion gear to rotate. The pinion drives a lead screw which powers the driver jaws, and the stud is fed into the workpiece in relation to its rotation. This tapping action produces a true female thread in the casting, whereas other machines simply rotate the part and simultaneously press it into the work. The percentage of rejects is high without the lead screw technique.

On its return stroke the pneumatic cylinder rotates the driving head out of the hole. As the head returns to its starting position, a metering bar is lifted and another stud is fed to the driver jaws. The unit is then ready for the next operation which is actuated when the operator presses a start button normally incorporated in a foot pedal.

An electrically energized vibratory hopper feeds studs to the metering bar. This hopper is supported on top of the unit and operates off a 115-V line. A head adjusting unit allows the vertical position of the head on the spindle to be varied so that castings of different heights may be accommodated. When used with standard 80 psi air source, the unit has a cycle term of 1½ sec. At this rate each unit consumes less than one third of a cubic foot of air/stroke. Because of its simple construction, the unit is practically failure proof and quantity production allows them to be manufactured at a much lower cost than a special machine. end



now change tools in seconds on your Bridgeport milling machine!

NEW MICROBORE FLASH-CHANGE SPINDLE MAKES IT POSSIBLE

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The Flash-Change Socket, an integral part of the spindle, combines maximum strength and rigidity for roughing with extreme accuracy for precise finishing operations. A full range of standard Flash-Change Adapters for end mills, shell end mills, drills, drill chucks and one- or two-tool Standard Microbore Boring Bars is also available.

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CIRCLE INFORM-A-GRAM KEY NO. 83

Numerical Control

FEATURES CHANGEABLE REFERENCE POINT

National Automatic Tool Company, Inc., has announced a numerical control system in which they have designed and built the entire integrated unit — machine, table, and controls.

This "Positioning" system is accurate within 0.001" in either axis, and all dimensions are read from a given reference point. This reference point in the NATCO system may be changed arbitrarily. This reduces time in locating the workpiece on the table and simplifies locating holes on the opposite side of the piece from one through hole.

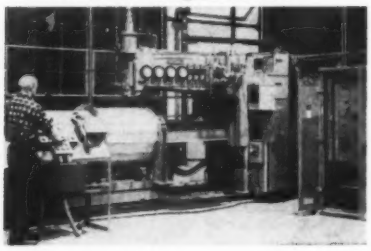
The standard table has a 24" x 36" working area, and indicator lights on the control console show when the final table location in each axis has been reached.

Machine operation is automatic or through operator's instruction numbers referenced to processing sheets. Up to 12 automatic functions and 99 operator instructions can be coded into the tape, and additional provision can be made when required. Although designed for drilling, tapping, and rough boring operations, the system can be used for other metal cutting operations.

WELDING DONE IN ONE-EIGHTH THE TIME

A numerically controlled resistance welding machine now in operation is used to weld tubes on cylindrical liners for jet engines. Approximately 3½ sec are required for each weld including the time for positioning between welds. The overall welding time on a liner has been reduced from 9½ hrs to 1½ hrs.

Its utilization has resulted in an 85% reduction in assembly and weld time and is expected to save about $26,000 annually in the manufacture of jet engines. This has been made possible by the application of two General Electric products — numerical positioning control and resistance welding control — to a National Electric welding machine.



Punched paper tape contains numerical information to position the workpiece to select three values of weld current and two values of weld time, to indicate when it is time to clean electrodes, to make sample welds, and to inspect welds. The tape may also contain instructions for cooling electrodes with a jet of water.

A special slope control unit in the synchronous resistance welding control panel permits the spot welding current to be increased gradually, thereby reducing the harmful welding effects caused by sudden surges of current.

For one movement along the length of the workpiece, a series of spot welds are required. After one such motion is completed, the piece rotates to the next series and the cycle repeats longitudinally. Weld spots vary from one to three per attachment depending on its length, with a total of 1600 welds. The entire process is repeated for 360° around the piece to complete the job. With this machine, one assembly can be completed in one-eighth of the time previously required, including setup operations.

SETUP AND DRILLING TIME IS REDUCED BY NUMERICAL CONTROL

A high-precision, numerically controlled automatic drilling machine has been developed by Barnes Drill Company and General Electric Company for use in the manufacture of jet engine components. The machine is expected to reduce setup and machining time by about 74%.

The special four-spindle Barnesdril is directed by a two-motion numerical positioning control manufactured by GE's Specialty Control Department. The drilling machine is designed to position within 0.005" true position tolerance, repeatable at accuracies of 0.001" over a maximum length of 40" and maximum dia of 50" while being positioned at a rate of 60 ipm.

Punched paper tape directs rotary and vertical motions for drilling, spotfacing, boring, reaming, tapping,

and chamfering. It also actuates the machining cycle and performs seven programmed functions: selection of one or both of the motions to be positioned, one of four spindle advances, one of four spindle speeds, one of two spindle feeds, one of three depth selections, position only or drill, and one of four dwell, no-dwell, and backfeed combinations.

In operation the part is mounted on the table and secured, the operator initiates the control to read the first block of information on the eight-channel tape, and the control system takes over. Interruption of the cycle caused by power failure, emergency stopping, or head return does not disrupt the cycle sequence. When the trouble is corrected, the operator can continue the cycle where it stopped by pushing a button.

This numerically-controlled drill is capable of accurate and economical production of parts that are too complex for a machinist to turn out manually with comparable accuracy and quality even at very slow speeds.

"We grind no axe . . . and really have no need to." After all, Bliss makes so many types and sizes of metalworking presses—actually many more than any other builder—that we favor only the one right press for your job. It may be a big one, a little one, a mechanical, a hydraulic, a standard or a special. But you can be sure it will be the *right* one.

If you have a pressed metal problem, isn't it logical to talk to a source that's certain to give you an impartial answer? To talk to Bliss?

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CIRCLE INFORM-A-GRAM KEY NO. 85

3 NEW HEAVYWEIGHT CHAMPS

in benchmaster's growing family!

Series 100
10 ton capacity

Here they are...3 exciting new Deep Throat Benchmasters built with all the pride and craftsmanship of the world's largest manufacturer of small presses and mills! These new models exceed all other Benchmasters in size, weight, work capacity and tonnage! With their sturdy, rigid frames you get all the latest refinements of Benchmaster's long experience in the field...*and remember 60% or more of all small presses sold are Benchmasters!*

For your deep throat requirements, for facilitating large pieces easier, use these new 10-ton Benchmasters... Unmatched for quality, *still* unbeaten for economy!

SPECIFICATIONS

SERIES "100" 10 TON DEEP THROAT PRESSES

	Model "100"	Model "110"	Model "120"
Crankshaft at Main Bearings	1½"	1½"	1½"
Standard Stroke	1¼"	1¼"	1¼"
Shut Height Bed to Slide, Stroke Down, Adj. Up, Std. Stroke	7¾"	10¾"	13¾"
Other Strokes Available	1½"-2" 2½"-3"	1½"-2" 2½"-3"	1½"-2" 2½"-3"
Shut Height for above strokes	7½"-7" 6½"-6"	10½"-10" 9½"-9"	13½"-13" 12½"-12"
Area of Bed front to back and left to right	8" x 11"	8" x 11"	8" x 11"
Bolster Plate Thickness	1"	1"	1"
Adjustment of Slide	1½"	1½"	1½"
Hole in Slide for Punch Shank	1⅜"	1⅜"	1⅜"
Center of Slide to Frame	12"	12"	12"
Flywheel Diameter and Face	18" x 3½"	18" x 3½"	18" x 3½"
Flywheel Weight (Approx.)	125#	125#	125#
Strokes per Minute	180-190	180-190	180-190
Motor H.P. and Speed	¾ HP 1140 RPM	¾ HP 1140 RPM	¾ HP 1140 RPM
Distance from Floor to Bed (Floor Models)	32½"	32½"	32½"
Distance from Bed to Center of Shaft	19¼"	22¼"	25¼"
Floor. Space FB × RL	20" x 35¼"	20" x 35¼"	20" x 35¼"
Overall Height	62⅛"	65⅛"	68⅛"
Size Opening through Back	5"	5"	5"
Shipping Weight Less Motor (Approx.)	940#	975#	1010#

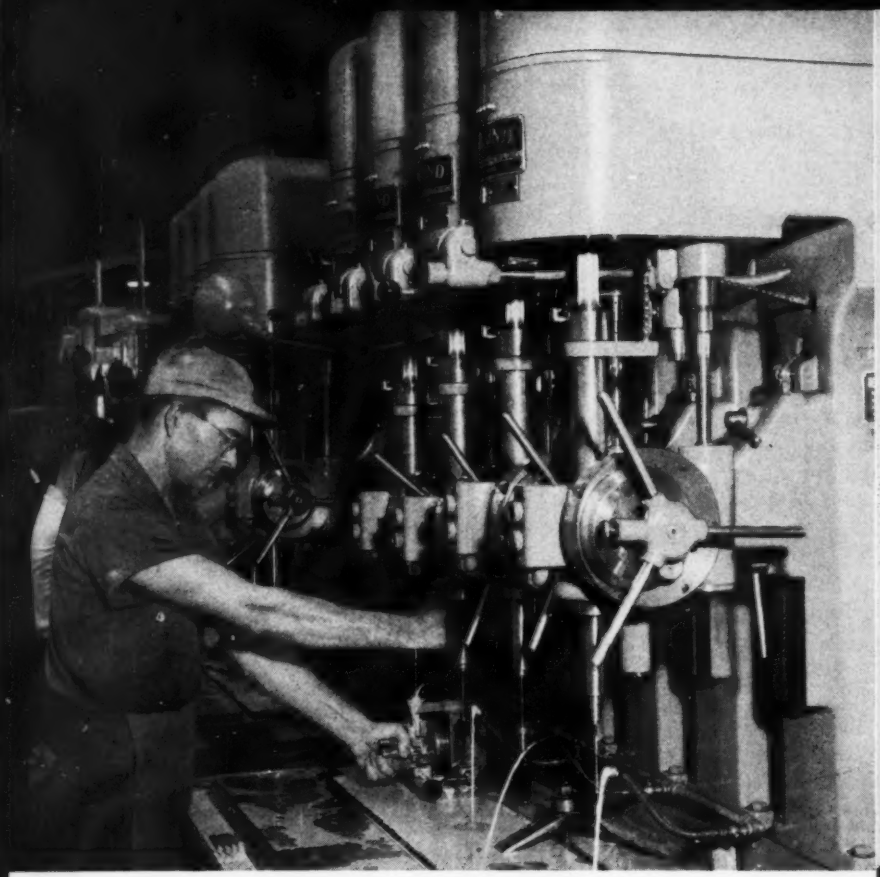
benchmaster

World's largest manufacturer of small punch presses and mills.

1835 West Rosecrans, Gardena, California

CIRCLE INFORM-A-GRAM KEY NO. 86

CATERPILLAR



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GREATER ECONOMY

INCREASED EFFICIENCY

Edlund 2F Drilling and Tapping machines in Caterpillar's Peoria Plant.

Dependable, rugged Edlund Drilling and Tapping machines meet the challenge of Caterpillar's exacting demands for better methods of manufacture. For drilling, reaming, chamfering operations these power-packed Edlund machines furnish constant, trouble-free service, reduce "down-time" to a minimum and require only routine maintenance.

Model 2F Features: **Top production machine for medium to heavy drilling and tapping. Infinitely variable speeds to 3600 rpm**
8" - 12" - 15" Overhang
1¼" Capacity
Write for Bulletin 140R

Also Model 1F with Infinite speeds to 10,000 rpm and
⅜" capacity.
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And Model 4F with Infinite speeds to 2200 rpm and
1¾" capacity.
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Division of Harsco Corporation

Willis Ehrhardt tells how Moore Jig Borers and Jig Grinders built nation-wide service

This is another in a series featuring the views of owners of leading contract tool and die companies

by **WILLIS G. EHRHARDT**
Managing Partner
Ehrhardt Tool & Machine Company
St. Louis, Mo.
Specialist in High-Precision
Gages and Dies

"*'A nation-wide service for the few who want the most in precision dies, tools and gages.*' That's what we claim; that's what we do. And the backbone of the facilities which enable us to provide this service, is our Moore Jig Grinding and Jig Boring equipment.

"We were the first contract tool and die company in our area to install these versatile machine tools years ago, and we've added the new models promptly. In addition to helping us maintain the highest precision standards, their very flexibility of application brings in a caliber of work which is often beyond the scope of toolrooms and of competition.

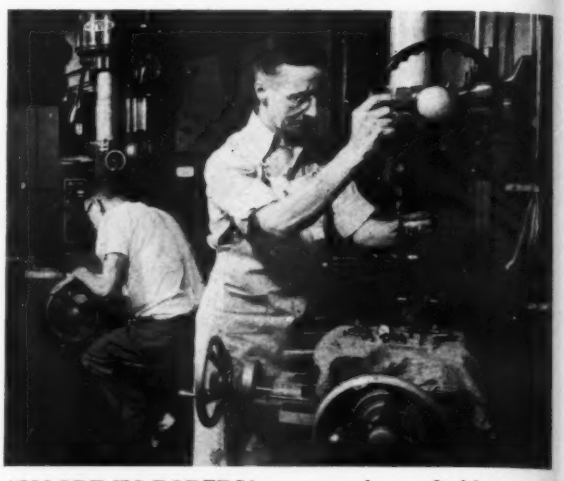
"We are quite proud, for example, of an *all-ground die*, machined entirely on the Moore Jig Grinder, *in hours*. Formerly, we could not have tackled its complex contours and holes. Equally intricate operations have been performed by our Moore Jig Borers.

"Beyond a doubt, the speed, ease of operation and high-precision of our Moore equipment for holes, contours and surfaces are prime factors in keeping us 'first on the Mississippi'."

Can Moore equipment cut costs in *your* toolroom? Moore shows you the way—with literature describing the features of these machines and how they can be used to your profit. For copies, just write...

MOORE SPECIAL TOOL COMPANY, INC.
726 Union Avenue, Bridgeport 7, Connecticut

HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts the modern way. 424 pages, 495 illustrations. $5 in U.S.A., $6 elsewhere.



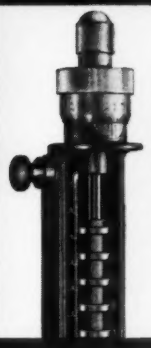
"MOORE JIG BORERS have proved a profitable investment from their first day of use. They've enabled us to spot, drill, ream and bore, at higher precisions, and faster, than any previous equipment. Carbide die work seems to be their 'cup of tea'."

"OUR MOORE JIG GRINDER has established a record of trouble-free performance absolutely unmatched... especially remarkable in view of the many 'trick' operations it is called upon to handle."

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 88



MICROMETER THIMBLE is graduated to .0001" and provides dimensions between 1" steps on measuring bar. Measuring bar can be adjusted to enable the user to take readings up or down relative to a center line or other reference line on the work.

accurate to .00005" throughout the 18" range

That's right! Just 10 seconds to set this NEW 18" PLA-CHEK GAGE . . . and you are ready to start your inspections. In hundreds of installations on innumerable jobs PLA-CHEK GAGES are daily proving their time-saving and money-saving advantages. Extremely easy to operate—no auxiliary gage blocks are necessary—this PLA-CHEK 18" model guarantees accuracy to fifty millionths through its entire range. The measuring bar is made of deep-frozen, strain-free alloy steel. Because it is of one-piece construction the steps cannot change or separate with age. Since it is not necessary to touch the measuring bar, body heat does not affect it. Return the coupon or write TODAY for literature and complete details.

Cadillac PLA-CHEK GAGES are available in a complete range of sizes: 6", 12", 18", 24", 36", and 48" models. Precision-made risers, increasing the range of each model, are also available.

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GAGE COMPANY
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CADILLAC GAGE COMPANY
P. O. BOX 3806, DETROIT 5, MICHIGAN
Without obligation please rush complete information on the Cadillac PLA-CHEK Gage line to:

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Company_____

Address_____

City_____ Zone____ State_____

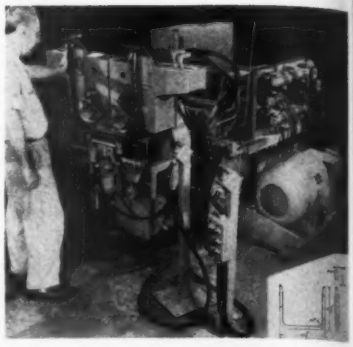
CIRCLE INFORM-A-GRAM KEY NO. 89

TWO PIVOTING HEADS SPEED BENDING

High speed bending with easy loading and unloading are featured in this bender developed for the automotive industry. The workpiece is a steel U-shaped radiator support channel which takes two 90° bends on a 3¾" inside radius. Production rate is 1000 bends/hr.

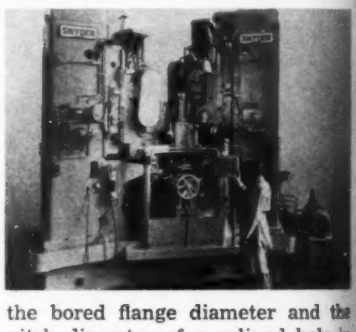
Material handling in and out of the bender, manufactured by Pines Engineering Company, is facilitated by the vertical design which features two pivoting heads that form two 90° bends simultaneously. After loading the channel into the dies and pressing the start button, the bending forms, mounted on pivoting heads, move in to clamp the workpiece and begin the bends. Wiper shoes move vertically to form the channel around the bending forms. After completion of the bends, the heads retract and the finished workpiece is ejected automatically.

Galling is virtually eliminated because the wiper shoes are supported in Ampco bronze ways which permit the shoes to move with the workpiece during the bending operation. This reduces maintenance and gives long die life without special lubrication of the workpiece during the bending operation.



SIX OPERATIONS DONE ON 50 JOINT FLANGES

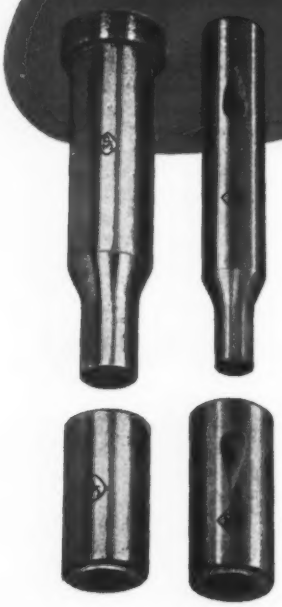
Fifty different universal joint flanges are faced, bored, counterbored, undercut, drilled, and chamfered on a versatile five-station rotary index machine. Flexibility of the machine, which applies automation concepts to low volume production, is achieved by providing interchangeable fixture details, drill heads, and cutting tools. Concentricity accuracy of 0.004" between the bored flange diameter and the pitch diameter of a splined hole in the part is maintained by the new machine, which produces up to 90 pcs/hr, depending on the part being processed.



Way-type machining units powered by three separate hydraulic power packs are used in each of the four machining stations. These have replaceable hardened-and-ground ways and are provided with automatic pressure lubrication. The five work fixtures are mounted on a rotary index table actuated by a hydraulic cylinder and shot-pin mechanisms. This pushbutton controlled, hydraulically-operated machine was designed and built by the Snyder Tool & Engineering Company.

If your feeling the PINCH...

For want of a PUNCH...



Talk to the people at

3P

It's a fast service company, staffed with personnel who know that "DOWN-TIME" is "LOST-TIME". Distributors in principle cities assure IMMEDIATE DELIVERY from over 37,000 sizes in stock.

You get the finest quality in 3P HEAD PUNCHES and DIE BUTTONS, because they are made from 3 types of the finest tool steel, and are available in any DECIMAL size.

*Reg.

NEVER FEEL THE PINCH!
GET 3P PUNCHES AND DIE BUTTONS WHEN YOU NEED THEM.

Porter Precision Products also make BAL-LOK* Punches and Die Buttons. They're always in stock and ready for IMMEDIATE DELIVERY too. Any DECIMAL size.

NO EXTRA CHARGE FOR FAST SERVICE HIGH QUALITY, OR ODD SIZES.

"Still the best performer"

PORTER PRECISION PRODUCTS
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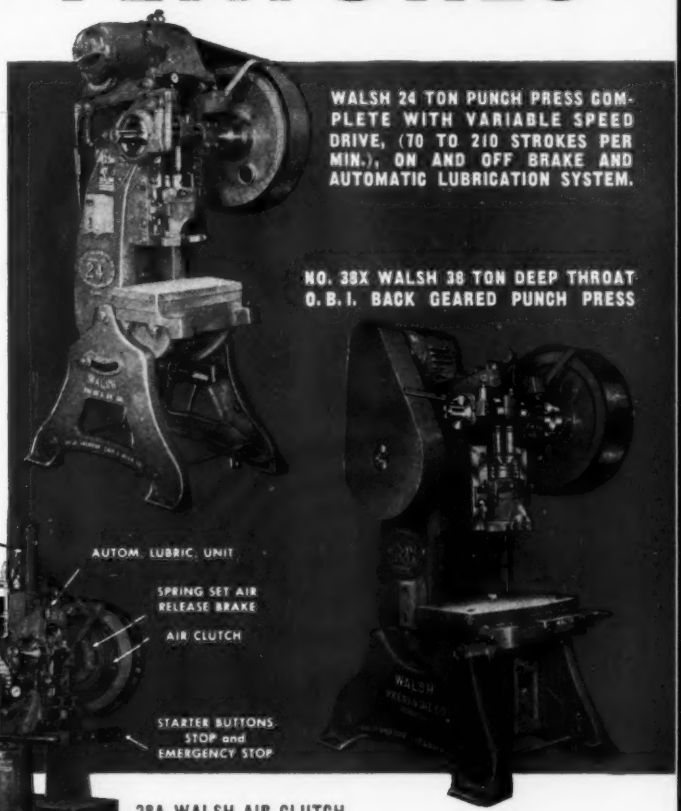
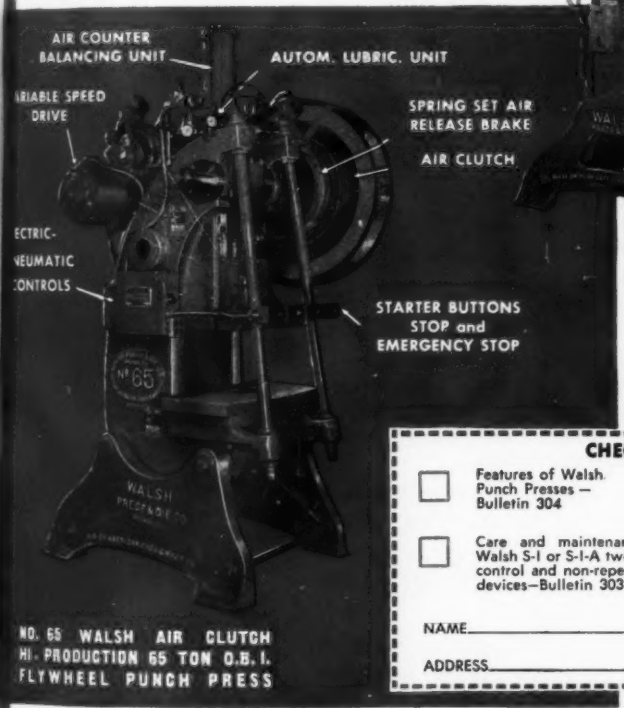
CIRCLE INFORM-A-GRAM KEY NO. 90

30 DESIGN FEATURES

WALSH PRESSES have 30 construction features, not all of which are found on any one other press. Send for new literature describing these features which have made Walsh Presses RUGGED AS THE ROCKIES since 1907.


WALSH 24 TON PUNCH PRESS COMPLETE WITH VARIABLE SPEED DRIVE, (70 TO 210 STROKES PER MIN.), ON AND OFF BRAKE AND AUTOMATIC LUBRICATION SYSTEM.
NO. 38X WALSH 38 TON DEEP THROAT O. B. I. BACK GEARED PUNCH PRESS
AIR COUNTER BALANCING UNIT
AUTOM. LUBRIC. UNIT
VARIABLE SPEED DRIVE
SPRING SET AIR RELEASE BRAKE
AIR CLUTCH
ELECTRIC-PNEUMATIC CONTROLS
STARTER BUTTONS STOP and EMERGENCY STOP
28A WALSH AIR CLUTCH HI-PRODUCTION 28 TON FLYWHEEL ARCH PRESS


AIR COUNTER BALANCING UNIT
AUTOM. LUBRIC. UNIT
SPRING SET AIR RELEASE BRAKE
AIR CLUTCH
STARTER BUTTONS STOP and EMERGENCY STOP
NO. 65 WALSH AIR CLUTCH HI-PRODUCTION 65 TON O.B.I. FLYWHEEL PUNCH PRESS

SEND FOR SPECIFICATIONS ON HORN, HI SPEED AND SPECIAL PRESSES

Presses other than specified with longer or shorter strokes made to order. For other requirements such as air clutch, on and off brakes, variable motor drives, air cushions, and automatic lubrication refer inquiries to us.

AUTOMATIC KNOCKOUT IS INCLUDED WITH ALL PRESSES
ALL PRESSES "RUN-IN" WITH MOLYKOTE AT THE FACTORY

CHECK LITERATURE DESIRED—NO OBLIGATION

- ☐ Features of Walsh Punch Presses — Bulletin 304
- ☐ "Spec" chart for Walsh Presses — Bulletin ES102
- ☐ Walsh Presses — Bulletin 353
- ☐ Care and maintenance of Walsh S-I or S-I-A two hand control and non-repeat devices—Bulletin 303
- ☐ Installation — Instructions for Walsh two hand control and non-repeating devices —Bulletin ES108
- ☐ Application and use of Walsh open back inclinable punch presses—Bulletin 202

NAME_____

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50th ANNIVERSARY **WALSH PRESS AND DIE COMPANY**

Division of American Gage and Machine Company

4709 W. KINZIE ST., CHICAGO 44, ILL.
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SIMPSON ELECTRIC CO.
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STANDARD TRANSFORMER CO.
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SIZE CONTROL CO.
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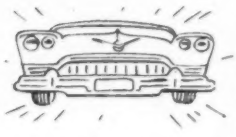
WE MANUFACTURE A COMPLETE LINE OF POWER PRESSES

CIRCLE INFORM-A-GRAM KEY NO. 91

Any similarity to a real-life company is purely intentional

How did they use their beans in Boston to cut forming rejects?

A couple of years ago, Otto Motive, super sales engineer of East Boston, Mass., began to eye a new prospect.



Thought he, "As an account, that Supercrate V-8 looks great. They buy a lot of parts. It sure would be peachy—and profitable—to land that plum!"

And, by golly, Otto did get a contract — to furnish wire-wheel units of 25-gauge stainless.

He also got *more* than he bargained for. Sleepless nights, for example. Because — though tempus fugited, production of the wire-wheel units didn't.

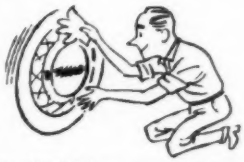
It seems that the boys in Otto's shop had trouble forming the hub-cap sections of the units. The stainless scored in the die. Rejects piled up. The scrap pile became something to behold. Delayed delivery dates caused delirium.

Then someone suggested trying dies made from Ampco Metal Grade 24 (a just cause for a raise, if we've ever heard of one!).

Rejects dropped off to practically nothing. Which is no surprise to us. Dies made from Ampco Metal have done as much for many a shop drawing or forming stainless or other clean metals—have made possible real savings.

And they can do as much for *you*. You can count on that!

Ampco Metal dies have an exceptionally low coefficient of friction. They don't load, gall, or scratch the work. They hold close tolerances longer.



You make a better product with fewer costly finishing operations. You cut scrap loss.

You reduce downtime, also. Ampco Metal dies have little or no pickup — you get far longer runs than with steel dies without redressing.

An Ampco stocking distributor near you carries 70 sizes of Ampco Metal die blanks — solid rounds, rectangles, and centrifugually cast rings. Call him.

AMPCO®

If you don't know who your Ampco distributor is, write us for his name. ***Ampco Metal, Inc., Dept. TP-3, Milwaukee 46, Wisconsin. (West Coast Plant: Burbank, California).***

AMPCO METAL

The metal without an equal

RM-6

CIRCLE INFORM-A-GRAM KEY NO. 92

for only $565.00*

DUMORE®
VERSA-MIL

PORTABLE PRECISION MACHINING

MILLS • BORES • SHAPES
SLOTS • GRINDS • DRILLS

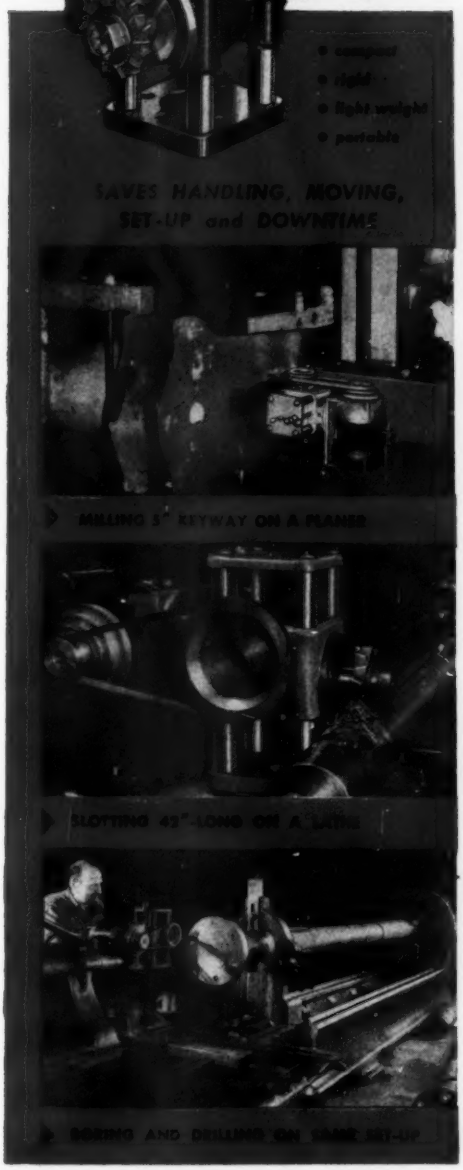
...anywhere!

This *new* machine efficiently performs at any angle, in any position or direction, as an independent unit with its own power and feeds, or added to machine tools — lathes, planers, shapers, millers, grinders.

Gives close tolerance results while removing metal at *profitable* rates. Adapts quickly to work on standard machines, fixed machinery in place, pieces in fixtured set-ups, or on parts too big for standard machines. *It gives you the advantage of machining where it is most economical!*

*Basic Unit F.O.B. Racine

FOR MAINTENANCE, SHOP, TOOL ROOM and MASS PRODUCTION USES


• compact
• rigid
• light weight
• portable
SAVES HANDLING, MOVING, SET-UP and DOWNTIME
MILLING 5" KEYWAY ON A PLANER
SLOTTING 42" LONG ON A LATHE
BORING AND DRILLING ON SAME SET-UP

GET THE FACTS . . . SEND COUPON

DUMORE®
PRECISION TOOLS

AUTOMATIC DRILL and TAP UNITS
MICRO DRILLS
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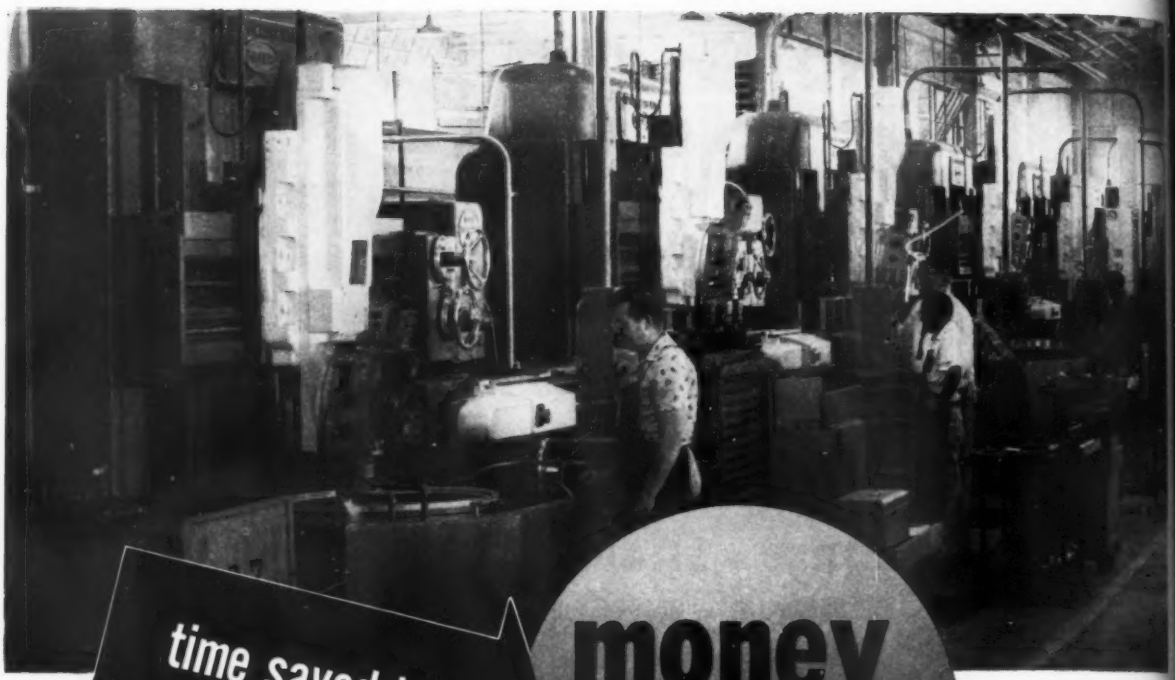


time saved is . . .

money earned

BULLARD

The application of Bullard Mau-Au-Trol Vertical Turret Lathes, Model 75, to the machining of aircraft turbine compressor cases clearly demonstrates the superiority of automatic operation.

According to Mr. George E. Saupe, Chief Manufacturing Engineer at Solar Aircraft Co., San Diego, California, these are some of the advantages:

1 Spoilage practically eliminated.

2 Machining time reduced from 14 hours to 1 hour and 42 minutes per unit.

3 In process inspection unnecessary.

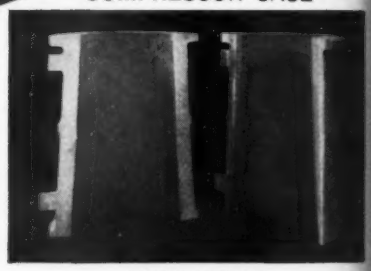
4 Better production control.

5 Reduces error of the operator.

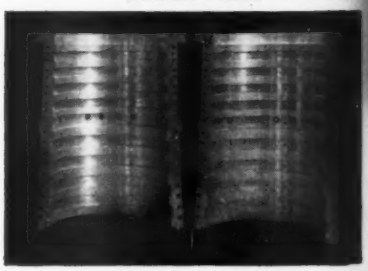
6 Less work in process inventory.

A call, to your nearest Bullard Sales Office or Distributor, can be your first step toward time saved and money earned with your machining problems.

SOLAR JUPITER COMPRESSOR CASE



ROUGH PIECE



FINISHED PIECE

THE BULLARD COMPANY
BRIDGEPORT 9, CONNECTICUT

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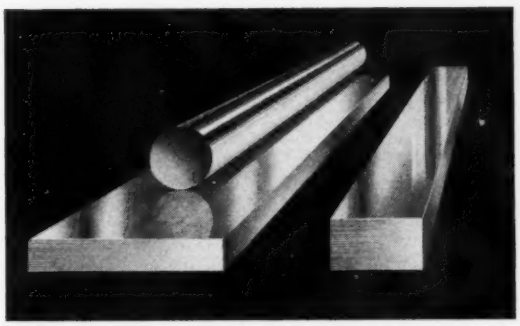


Prefinished tool steels of *quality*

FOR TOOLS, DIES, AND PRECISION PARTS

PRECISION GROUND
OIL HARDENING NON-WARPING TOOL STEEL

Warplis
FLAT STOCK
FLATS & SQUARES

OIL HARDENING
NON-WARPING
Warplis
DRILL RODS
ROUNDS

. . . these companion products come in hundreds of sizes, available from selected distributors coast-to-coast. Descriptive price lists on request.

High standards of production assure flawlessly finished, perfectly dimensioned steel, all ready for the talents of the tool and die and parts maker. The composition (01) is generally regarded as the finest of its type—safe hardening . . . versatile of application . . . tops in performance at the working point.

PITTSBURGH TOOL STEEL WIRE COMPANY

Specialists in cold finished fine steels since 1902

MONACA, PENNSYLVANIA

CIRCLE INFORM-A-GRAM KEY NO. 95

CHEMICAL MILLING PRODUCES COMPLEX NINE-STEP PART

The most complicated part formed up to now by the chemical milling technique is in quantity production. This part requires nine different milling steps that involve three different taper angles.

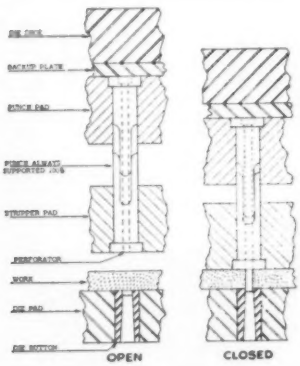
After the plate has passed through staging and been thoroughly cleaned, a coating is applied which restricts removal of the metal. The area of the first cut is scribed, and the coating or maskant is stripped off the area to be milled. Upon completion of the first cut the exposed section is masked again and three other areas are scribed, stripped, and chemical milled.

After all four tapers are completed, the whole part is completely masked. The area of the deepest cut is then scribed, stripped, and milled. Since each of the remaining five steps represents a shallower cut, no further masking is required. As each succeeding area is scribed and milled, additional metal is removed from the exposed sections in order to bring all six cuts to their final, specified depths at the same moment.

The single integrally-stiffened part chemically milled by United States Chemical Milling Corporation has displaced nine separate pieces, which heretofore would have had to be riveted, bonded, or welded together to form a sub-assembly with structural weaknesses and higher manufacturing costs.

Because . . .

WHEN PUNCHING IT IS 100% SUPPORTED BY A TELESCOPING SUPPORT-SLEEVE



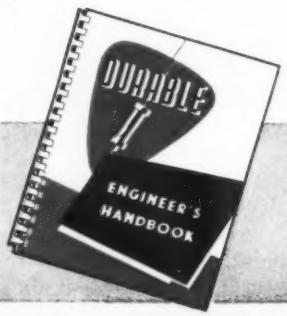
Typical Installation

A Durable Perforator stays "alive" longer, because it is supported 100% the full stroke of its Telescoping Sleeve.

You get positive alignment, closer tolerances, burr free holes, regardless of the types of metal used. Holes are punched faster, easier and accurately.

Write For The New
DURABLE ENGINEER'S HANDBOOK

121 pages showing
100 Practical Die Designs.
NO CHARGE, NO OBLIGATION



Patented and made exclusively by

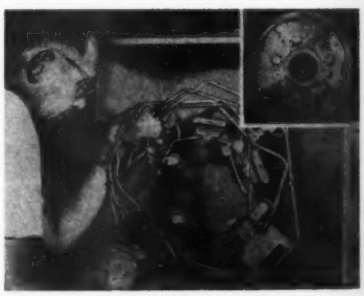
DURABLE PUNCH & DIE COMPANY

9030 South Hermitage St., Chicago 20, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 96

EXTRUDED STEEL SHAPES APPLIED TO AIRCRAFT MECHANISM

A mid-west manufacturer recently switched to extruded shapes and is saving 50 to 70% material weight over conventional bar stock formerly used in making sections or pads of the hydraulic "feathering" mechanism for planes. This hydraulic mechanism is made of dozens of small tube sections which are turned and bent into unusual shapes and are connected to the extruded pads. The unusually shaped pads send the oil into a number of different directions.



Some models have as high as 26 of them. The model illustrated has 17 pads; 14 lbs of extrusions.

Use of steel extrusions, reports Allegheny Ludlum Steel Corporation, has minimized hydraulic leaks during system checks under extremely high pressure. The system is tested under 7500 psi but operates generally at about 3000 psi. After the system is made, it is cast into a unit with all the tubes and pads becoming a single piece of equipment.

Save 27% or more in cost...

NEW

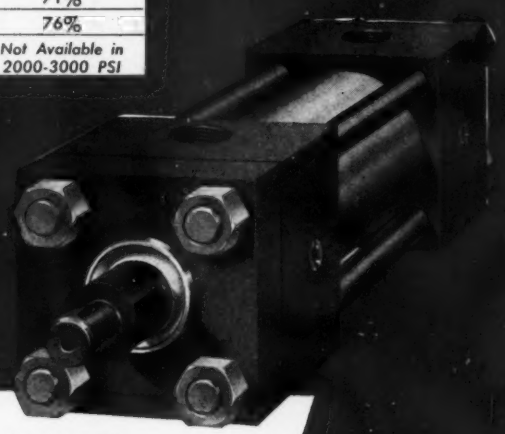
Miller

"JOB RATED"

HYDRAULIC CYLINDER LINE

JOB RATED, MODEL " J "			
BORE	SEVERE OPERATING CONDITIONS	MODERATE OPERATING CONDITIONS	YOU SAVE THIS % IN PRICE OVER STANDARD 2000-3000 PSI CYLINDERS
1½"	1500 PSI	2500 PSI	27%
2	1500	2500	27%
2½	1000	1500	28%
3¼	1500	2500	32%
4	1000	1500	35%
5	800	1200	37%
6	800	1200	43%
8	500	800	50%
10	500	800	71%
12	500	800	76%
14	500	800	*Not Available in 2000-3000 PSI*

with IDENTICAL seals, design, and safety factors as the famous Miller "Power-Packed" Model "H" Line for 3000-5000 psi service.



SEAL FAILURE MEANS CYLINDER FAILURE!

1. *No seal made of synthetic rubber is compatible with even 50% of available, commercial, petroleum base hydraulic fluids.*

MILLER Uses All Teflon* Seals to Eliminate External Oil Leakage because Teflon is impervious to all known hydraulic fluids, even fire-resistant types.

TEFLON SHEF SEAL At Tubing Ends

No blind assembly. Is
Shear-proof
Heat-proof
Extrusion-proof
Fluid-proof

TEFLON Seals On Piston Rod And Bushing

Teflon rod flange seal requires no adjustment. Teflon bushing seal is shearproof. Teflon wiper keeps dirt out.

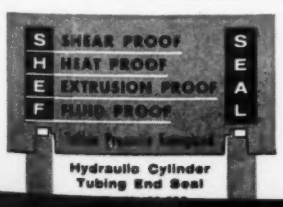
TEFLON Seals On Ball Check And Adjusting Screw

Non-protruding, self-locking, cushion adjusting screw interchangeable with ball check for easy access.

MILLER Uses Resin-Impregnated Leather Piston Cup Seals because they are compatible with petroleum base fluids and some fire-resistant types. Teflon cups available at small extra cost.

2. *Nicked or scored piston rods cause seal failure*

MILLER Uses Case-Hardened Chrome-Plated Piston Rods because they prevent nicks, scoring and rust.



OTHER MILLER QUALITY FEATURES
- Rust-Resistant Surfaces
- Interchangeable, Space-Saving Square, 4-Tie-Rod Design
- Precision Honed Barrels

MILLER FLUID POWER

2046 N. Hawthorn Avenue Melrose Park, Ill.

HARDINGE
ELMIRA, N.Y.

HARDINGE EASY READING BLACK and WHITE DIALS

mean INCREASED PRODUCTION

. . . **HARDINGE** developed these fast setting, easy reading **black and white dials** — they assure maximum accuracy with high production.

Pioneered with the Hardinge High Speed Precision Chucking Machine model HCT shown here — **Hardinge black and white dials** are now standard equipment at **no extra cost** on all of our tool room and production machines.

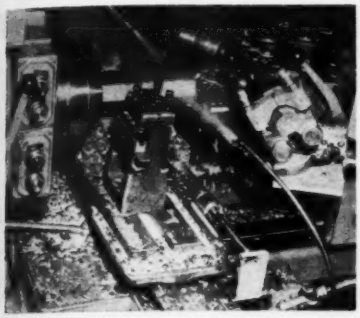
Invest in Hardinge equipment for product improvement and increased production. Ask for bulletin on our tool room and production machines.

HARDINGE BROTHERS, INC.
ELMIRA, N. Y.

TOOL LIFE, SPEEDS, AND FEEDS INCREASED WITH MIST COOLANT

Ampco metal is a bronze alloy with many unusual characteristics. It is corrosion and wear-resistant, and has high impact strength, but it presents tough machining problems and causes short tool life.

Ampco Metal, Inc. which produces this alloy, also does a considerable amount of finished and semi-finished work on their own material. Their



machine shop was faced with excessive perishable tool costs, but recent installation of Arrow Jet Mist Generators on four of their machines has resulted in greatly lengthened tool life and increased speeds and feeds.

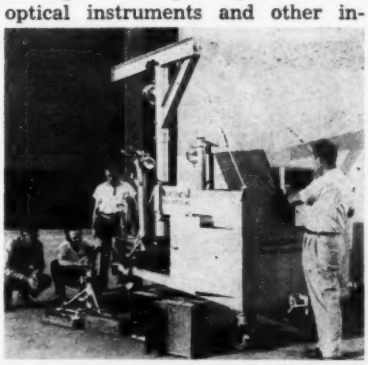
Because of their compact design, the units are easily mounted close to the work for ease of operation and convenience of the operator. They are small, self-contained units that utilize the machine's sump pump and a 6 to 8 psi shop air line for generating the soluble oil jet coolant spray.

Virgil Heber, superintendent of Ampco's machine shop, estimated that first-year perishable tool savings for the four machines now equipped will be $18,000. It is planned to similarly equip other machines and obtain further savings.

MOBILE UNIT REDUCES COST OF JIG INSPECTION

Chance Vought Aircraft has developed a unique tool inspection method which greatly reduces jig downtime in production. Adoption of this method has reduced inspection cost by 89%.

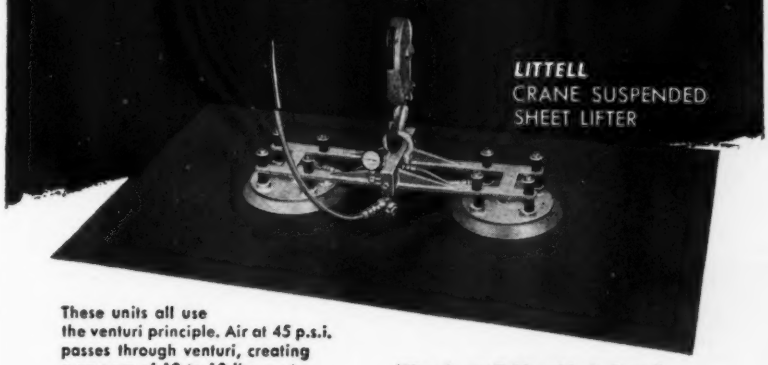
The problem of inspecting 144 jigs located in various areas of the plant was solved by designing and building a mobile unit in which all inspection equipment could be stored and transported. Each compartment of the unit is specially designed for storing and transporting the delicate optical instruments and other in-



spection aids such as tooling bars, alignment telescopes, targets, transits, tilling levels, instrument stands, master squares, linear scales, plus gages, pins, and micrometers.

Development of the system included preparing a manual outlining complete procedure for inspection of each of the 144 jigs and fixtures and all tools needed for the job. A three-man team, two jig builders and an inspector, operates full time inspecting the fixtures. Jig downtime has been reduced to a minimum of 4 hrs for fixtures formerly requiring several days.

LIFT or MOVE
SHEETS or BLANKS
BY AIR

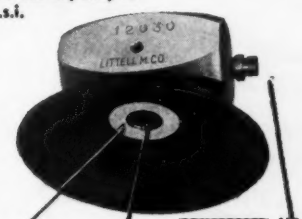


These units all use the venturi principle. Air at 45 p.s.i. passes through venturi, creating a vacuum of 10 to 12 lbs. p.s.i.

Lifter is available with 1, 2 or 3 cups in 6" to 14" diameters. Illustration shows 8" diameter cups. (Lifting capacity 250 lbs. with 4 to 1 factor of safety.)

LITTELL
HAND TYPE SHEET LIFTER
. . . is designed for safety and ease of operation in moving sheets of steel, plasterboard, plywood, masonite, glass, etc. and has capacity to pull 11 lbs. p.s.i.

LITTELL
VENTURI BLOCKS
These units are easily adapted to automatic equipment when a vacuum pick-up is required. Can be supplied with ~2¼" to 5" cups.



Write for FREE Catalog.

VAC-U-MATION DIVISION
LITTELL MACHINE CO.
4197 Ravenswood Avenue, Chicago 13, Illinois
District Offices: Detroit and Cleveland
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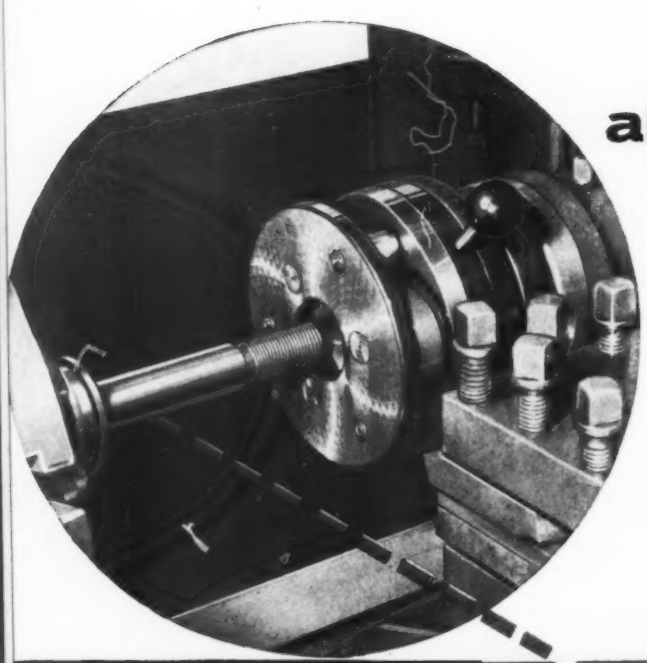
CIRCLE INFORM-A-GRAM KEY NO. 99

Acme-Fette

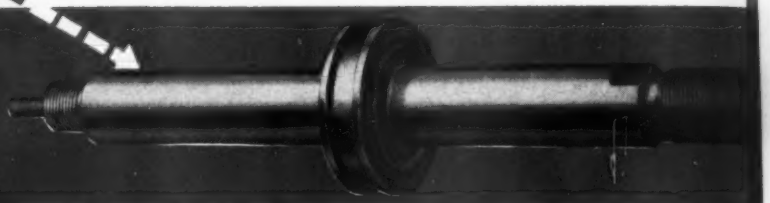


Rolls threads to aircraft specification for Class 3 fit . . .

Here's a piece that would be costly to thread by sing point chasing or thread grinding. It's a high-temperatu hydraulic actuator for aircraft use. The piece is machin from a 4340 steel upset forging with a tensile strength over 160,000 p.s.i.—heat treated to a hardness of betwe 36 and 40 on the Rockwell C scale.

After a careful study of the problem, Air-Hydraulic to engineers assigned the job to Acme-Fette self-openi thread rolling heads.

1"-20, Class 3 thread, being rolled from the end with an Acme-Fette self-opening thread rolling head at Air-Hydraulic Inc., Cleveland, Ohio.



Here's the result.

1"-20, ¾"-16, and 5/16"-24 threads were rolled on this actuator 5 time faster than possible with conventional thread cutting dies—thread rolling speeds are equal to turning speeds with high speed tool steels.

Cold-forming action of the Acme-Fette produced a tougher thread and one 60% smoother than grinding or chasing (a 5 micro-inch finish). Rejection rate of less than ½ of 1% meant big savings because threading was the last of a number of costly machine operations.

Threads were produced on existing equipment with the sole addition of Acme-Fette thread rolling heads. Thus, major machine investment was eliminated.

See Acme-Fette thread rolling demonstration at the ASTE show in Philadelphia, May 1-8

Booth 2115

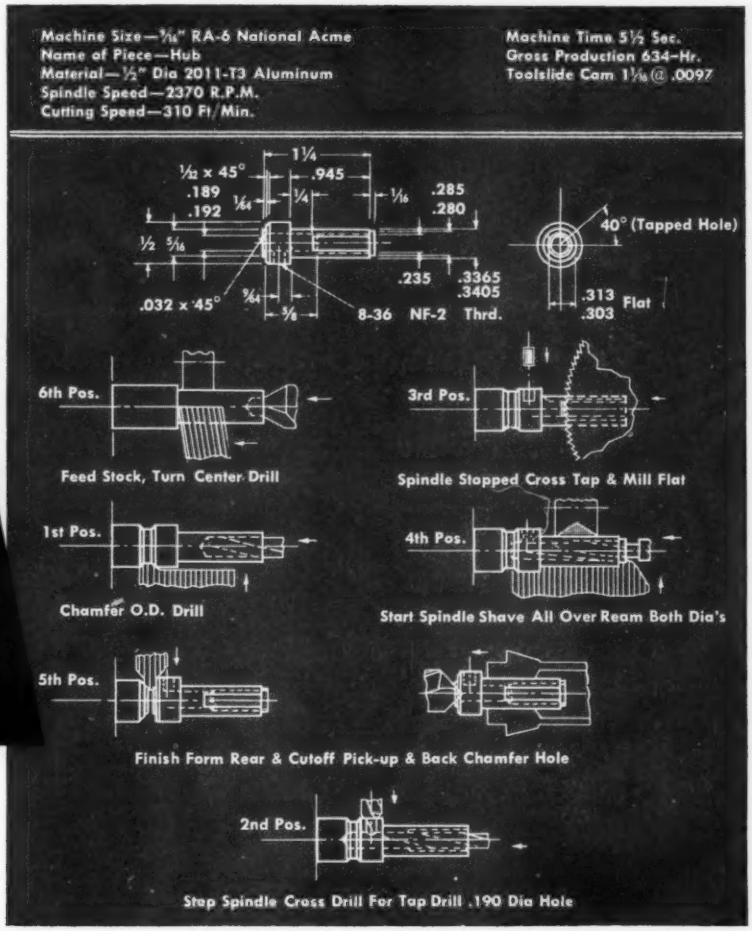
Find out how you can put Acme-Fette self-opening thread rolling heads to work for you—on your present equipment. Write for your copy of Bulletin NAF-57A. It will show you how you can save money on short or long runs by thread rolling with Acme-Fette.

THE National Acme COMPANY

THE NATIONAL ACME COMPANY, 169 E. 131ST ST., CLEVELAND 8, OHIO • SALES OFFICES: Newark 2, N. J. • Chicago 6, Ill. • Detroit 27, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 100

BETTER MACHINING STARTS WITH ALCOA SCREW MACHINE STOCK



Machining time of this part was cut 59 per cent with Alcoa Aluminum

When a famous machine tool builder switched a heat regulator part to Alcoa® Aluminum Screw Machine Stock, production went up, machine time went down, resulting in lower costs.

This hub, for example, is now turned out in 5.5 seconds, including drill, tap, mill flat, ream to burr and chamfer. Previous time with leaded steel: 13.6 seconds.

Alcoa Screw Machine Stock turns at remarkable feeds and speeds—1,000 ft/min. is common. This really pays off when the part gets complicated. In the tooling layout above, notice the cross drilling in the 2nd position and cross tapping and milling in the 3rd position.

Find out more about Alcoa Aluminum's machinability, better finishes, lighter weight. Here are three ways to do it:

- **Meet Tom Conroy,** Alcoa's screw machine specialist and field consultant. He will be glad to demonstrate aluminum's machining advantages. See coupon.
- **Send for free book,** *Alcoa Aluminum in Automatic Screw Machines.* It's a valuable procedures manual written for production men.
- **Ask for immediate stock delivery** by calling your nearest Alcoa sales office or Alcoa distributor.

ALCOA ALUMINUM
SCREW MACHINE STOCK
ALUMINUM COMPANY OF AMERICA

"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

Aluminum Company of America
876-C Alcoa Building, Pittsburgh 19, Pa.

Yes, I'd like to—

☐ hear from Tom Conroy.

☐ have a copy of *Alcoa Aluminum in Automatic Screw Machines.*

Name_____

Position_____

Company_____

Address_____

City_____ Zone_____ State_____

CIRCLE INFORM-A-GRAM KEY NO. 101

What is your swaging I.Q.?

Are you aware of the new techniques and equipment that are making rotary swaging increasingly important as a basic precision production process? Test your knowledge of modern rotary swaging with this TRUE or FALSE quiz.

SWAGING is economical—no chips, no scrap . . .

SWAGING produces work accurate within ± .001" . . .

SWAGING improves physical characteristics . . .

SWAGING can produce inside contours . . .

SWAGING can be automatic or semi-automatic and does not require skilled labor for operation . . .

FENN is one of the largest manufacturers of a complete size range of swaging equipment . . .

FENN swaging equipment swages tubing up to 6¼" diameter and solid bar stock from pinpoint to 3¾" diameter . . .

If you answered TRUE to all the questions, your knowledge is excellent. If not, you should have more information on modern rotary swaging.

In either case, it will pay you to get a copy of the new Fenn Swaging Catalog No. SM56. Write today!

FENN ROTARY Swaging Machines

FENN MANUFACTURING CO., 201 FENN ROAD, NEWINGTON, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 102

PUNCH PRESS SHEARING CUTS TUBE SCRAP

Switching from screw machines to standard punch presses with special shear cutters has virtually eliminated scrap in the production of rotating band blanks for artillery shells. Wolverine Tube, Division of Calumet & Hecla, Inc., makes rotating band blanks from 90-10 brass tubing, 20′ long. The bands are used on 20 mm and 40 mm artillery projectiles to ride the gun barrel rifling and give the projectile correct spin.

Originally the tubing was cut into bands on a standard screw machine, using a 1/16" cutter. This resulted in 1/16" scrap for each 1/8" band produced. By going to power sawing, the amount of scrap per band was reduced to 0.025", or approximately 20%. Shear cutting reduced scrap material to the tubing's end piece, which is too short to be held in the press.

Operational sequence is simple. A tube is fed into and through the fixed head and into the movable head of the punch press. The downstroke of the movable head shears off and automatically ejects a band, and the return-to-rest position advances the tube for the next cut. The press stops automatically when the tube has advanced 12" short of the end.

The three-piece die, made of D3 type tool steel, consists of a movable head, a fixed head, and a backup stand. The fixed head mounts a cutter for the OD, while the ID is controlled by the cutter mounted on the tube guide rod. The movable head mounts a cutter for the ID, a cutter for the OD, and a flanged bushing. The bushing determines the length of the band being cut by controlling the depth to which the tube penetrates the movable head. By means of a cam slide ejector, the bushing also acts to strip the sheared band from the cutter.

new

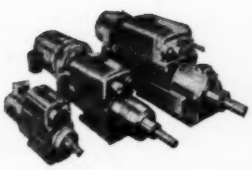
HARTFORD DOUBLE END MACHINE

$3,565* Complete

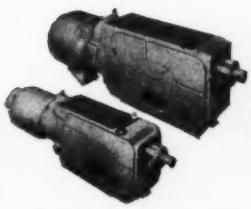
Model 10-210 as shown less fixture, F.O.B. Simsbury, Connecticut. Price and specifications subject to change without notice.

- Opposed operations simultaneously
- Quick change of stroke, feed rate, spindle speed and unit position
- Handles parts up to 28" long
- Available with manual or automatic interlocked cycle
- Coolant tank, coolant pump, chip pan and coolant troughs integral with base
- Drill capacity to 5/16" in mild steel with 19-150 Unit
- Tapping capacity 3/8" with a maximum stroke of 1½"
- Use with small index table, manual or air clamp fixtures, hopper load devices or vibration feeders
- Adaptable to multiple spindle head applications
- Performs two operations per hole with index table
- Inexpensive, fast, flexible centering operations
- Available as basic machine — completely tooled or as separate components

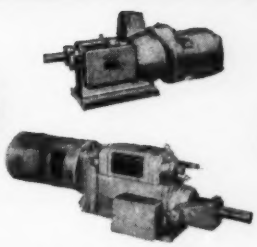
Rectangular Bases — 8" x 60" finished mounting pad accommodates a variety of drilling, boring or tapping units. Coolant tank with pump mounting flange, drain port, chip pan and large coolant troughs included. Adaptable to small index tables, air clamps or other part locators.



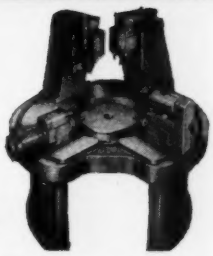
Automatic Drilling and Tapping Units — The Hartford Model 19-150 Quill Type Drill Unit is ideally suited as a working unit on the Double End Machine for production drilling, tapping, reaming, spot-facing, centering, milling, chamfering and countersinking. Other Hartford Units can be readily adapted also.



Automatic Cam Feed Drilling Units—Two models of these mechanical feed units are available. Designed for use with multiple head as well as single spindle applications, these electric clutch units are compact, dependable and fast cycling. They provide positive accuracy on long run jobs.



Automatic Lead Screw Tapping Units—No. 22 unit, above, features lead change through gearing from master lead screw. No. 19-175 unit, below, features variable quick advance stroke before starting lead screw spindle.



Other Hartford standard basic components including circular bases, straight post columns, tunnel columns and unit adapters can be combined with standard Hartford drilling and tapping units for assembly into production machines such as the 65" horizontal indexing machine shown above.

HARTFORD *Special*

Hartford also makes automatic Thread Rolling Machines,

Machine Tool Division
THE HARTFORD SPECIAL MACHINERY CO.
2923 Homestead Ave., Hartford 12, Conn.

Send me complete information on Model 10-210 Machine and other machine components.

Name_____ Title_____

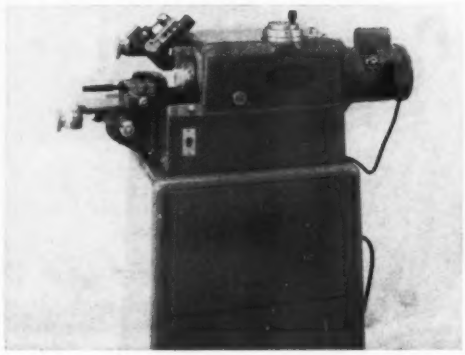
Company_____

Street_____

City_____ Zone____ State_____

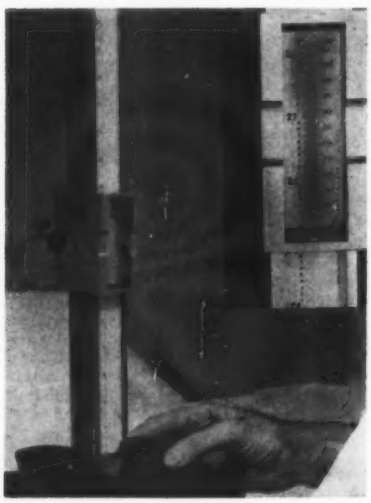
PRODUCTS on PARADE

For more information about the products described here, use POSTAGE-FREE Reader Service Card in this issue.



Apply The Spiral Point to standard twist drills using this Spiropoint drill sharpener, designed to grind the precision drill point geometry quickly, accurately, and economically. The drill is held stationary and the generating system gyrates the wheel around the drill axis to produce the desired shape on the end of the drill. The drills require no center punching, do not walk on curved surfaces, reduce workpiece distortion, last longer, and produce rounder, straighter, on-size holes. Cincinnati Lathe and Tool Co., Cincinnati 9, or—
Circle Inform-A-Gram No. A1.

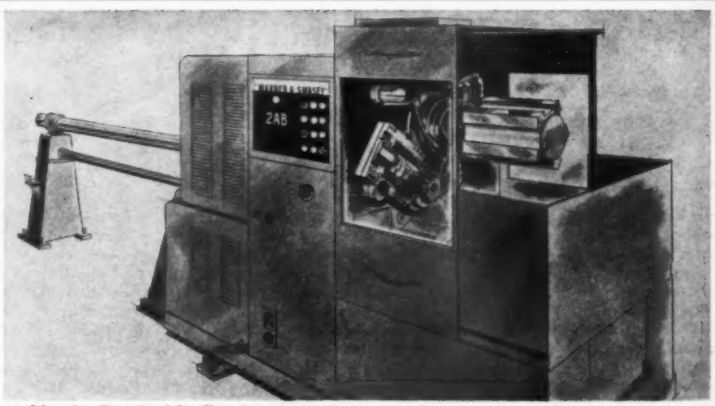
Transparent Glass Window Scales are one of the features of this height gage. This scale and vernier lines are machine divided and etched to be read from the rear of the gage. The double length vernier is 2.450" long and adjustable. An inwardly curved chrome reflector behind the glass scale diffuses light and shows the scale, vernier lines, and numbers sharply. George Scherr Co., Inc., 200 Lafayette St., New York 12.
Circle Inform-A-Gram No. A2.



Precision Lead and Feed Screws of any size are now available up to 20' in length. They have milled threads, and are hardened and ground for super precision. Enterprise Tool & Gear Corp., 8320 E. McNichols Rd., Detroit 34, Mich., or
Circle Inform-A-Gram No. A3.

Fill in Scratches or Scoring left on surface of the dies after grinding to remove metal pick-up or galling with the Die Lube Stick. In dry form, like a large crayon, it can be quickly applied to the area affected and dies need not be removed. Lubricants Inc., 16170 James Couzens Highway, Detroit 21, or —
Circle Inform-A-Gram No. A4.

Get Full Support on Short Hole Applications using the drawbar model of a shorter arbor and collet. In the Tork-Lok series, overall length of the arbor has been reduced in all sizes to about ⅞" of the length, and the interchangeable collets will cover the size range from ½" to 2 9/16". N. A. Woodworth Co., Standard Products Div'n., Detroit 20, or—
Circle Inform-A-Gram No. A5.



Obtain Profitable Production of complex, precision bar jobs on a fast, automatic basis with the 2AB single spindle bar automatic. This machine now makes efficient metal removing capabilities available for a range of precision work, both short and long run. Automatic selection of spindle speeds, feed changes, cutting stroke length, turret indexing, and both front and rear cross slide operation are provided. The Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, or —
Circle Inform-A-Gram No. A6.

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Designers and Manufacturers of Tools, Dies, Jigs, Fixtures, Metal Stampings.

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Complete Plant Routing and Tooling

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WO 1-4736
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THE INDUSTRIAL MACHINE CO.
1436 East 47th St., Cleveland, Ohio. Founded in 1908. Builders of Special Machinery. General Machine Work.

KIFFER TOOL & DIE CO.
5601 Tillman Avenue, Cleveland, Ohio, WOodbine 1-2440 & 1-2441. Manufacturers of Special Machinery, Tools, Dies, Jigs, Fixtures, Swiss Jig Boring.

NOBLE & STANTON, INC.
998 Broadway, Bedford, Ohio, Bedford 2-2800. Tooling, Short Run Production and Machined Parts for Automation.

Pennsylvania

MEDAL MANUFACTURING CO.
328 Vine St., Sharon, Pa. Machined parts, complete machine assemblies, special machinery. Send us your prints for quotes.

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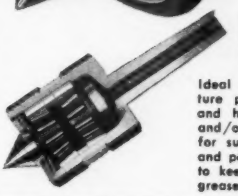
IDEAL GOLD BAND LIVE CENTERS

GUARANTEED TO MATCH OR EXCEED, "CRITICAL" JOB SPECIFICATIONS

In the GOLD BAND line Ideal has combined the latest production methods with their traditionally fine craftsmanship to bring you an unequalled standard of excellence in live centers. Accurate, (to ± .0001") GOLD BAND Live Centers offer "custom" quality at production prices. Specify GOLD BAND Live Centers and your every need can be accommodated from stock . . . 99 times out of 100. Ideal's GOLD BAND Live Centers offer savings, simplified operations and higher lathe output both in quantity and quality. Contact your distributor today...or



PRECISION FITTED BEARINGS

Ideal Live Centers feature precision machined and hardened ball and/or roller bearings for superior accuracy and performance. Sealed to keep dirt out, grease in.

A COMPLETE LINE FOR EVERY NEED...SPECIALS, TOO!

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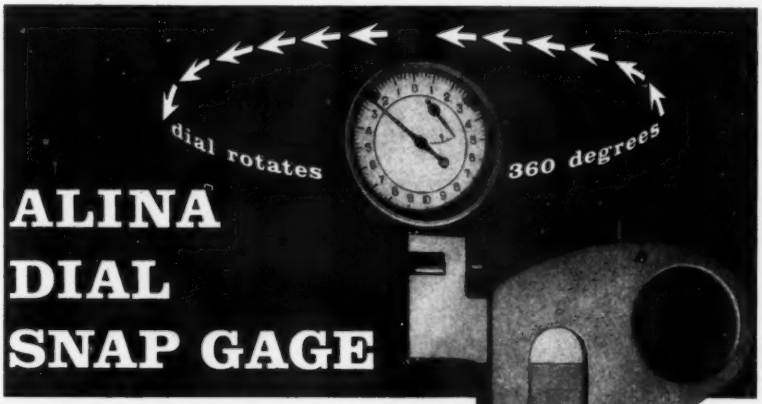

ALINA DIAL SNAP GAGE

ALWAYS REPEATS

The No. HO 1 is ideal for rapid and accurate measurements of a wide variety of parts ranging in size from 0-1". It has a throat depth of 11/16" and the indicator may be *rotated thru 360°*.
The HO 1 may be used with either the right or left hand.
Both anvils are Tungsten Carbide to provide long and accurate on-the-job service.
Furnished in handsome hardwood case.

Model No.
HO 1
Graduated .0001"

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ALINA CORPORATION
122 East Second Street, Mineola, L. I., N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1053

Chicago-Latrobe Carbide Bore Reamers help boost Rambler production

Reaming and chamfering in one trouble-free operation increases production on American Motors cylinder head line

Big news in the industry is the sales climb of American Motors' Rambler. At Rambler's Kenosha plant, the line is operating at capacity to meet demand.

Chicago-Latrobe Service Engineers work regularly with AM to get more and more production with greater precision into all their drilling and reaming operations. In the photo, four guide bushings are reamed and chamfered at one time—using Chicago-Latrobe Carbide Bore Reamers. This unusual setup is saving time . . . keeping vital parts moving.

C-L tools for difficult drilling and reaming jobs may answer some production problem in your plant. Ask a Chicago-Latrobe distributor to bring in a C-L Service Engineer. Regardless of the size of your operation, he's at your disposal without cost or obligation.

CHICAGO-LATROBE

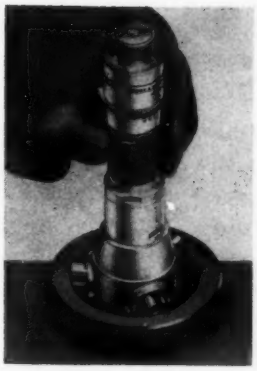
422 W. ONTARIO STREET, CHICAGO 10, ILLINOIS

ORDER THROUGH YOUR LOCAL C-L STOCKING DISTRIBUTOR

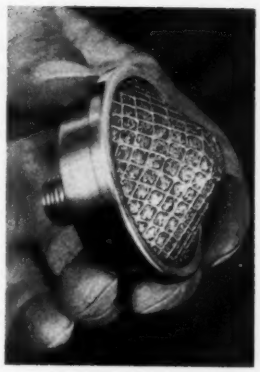
DRILLS · REAMERS · END MILLS · COUNTERSINKS · COUNTERBORES · CARBIDE TOOLS

INDUSTRIAL DISTRIBUTION SERVING INDUSTRY ECONOMICALLY THE RIGHT

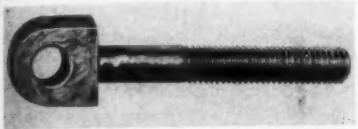
An Internal Tri-Point Micrometer. Intrimik, is adjustable over a wide range of sizes. Because three measuring points make line contact with the surface, the instrument aligns itself axially and radially. They are available individually or in five sets with ranges from 0.257" to 8.000". Brown & Sharpe Mfg. Co., Providence, R. I., or — **Circle No. A7.**



A Compact Silencer reduces objectionable noise from air exhausts without noticeably impairing efficiency of air-operated equipment. The Muffle-Maze mounts directly on any discharge port or piping by means of standard pipe thread. It can be used on all types of air and vacuum devices. Air-Maze Corp., Cleveland 28, or — **Circle No. A11.**

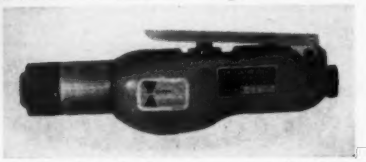


Latch Bolts are machined from the solid and cyanide hardened for maximum toughness. They are available from stock in both stand-



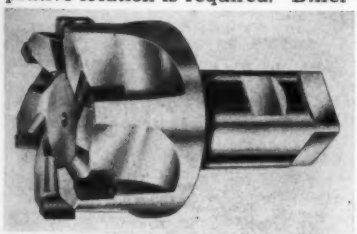
ard and long lengths with ¼", 5/16", ⅜", ½", or ⅝" thread sizes. Northwestern Tools, Inc., 116 Hollier Ave., Dayton 3, Ohio. **Circle Inform-A-Gram No. A8.**

A Bully Air Hammer is designed with a straight handle for easy, one-handed operation in close quarters or for blind spot work. Model SP-2-900B can also be suspended from



overhead reels for use on production lines. The slip chuck easily snaps in or out tools used for scaling, chiseling, peening, and other operations. Superior Pneumatic & Mfg., Inc., 4758 Warner Rd., Cleveland 25, or—**Circle Inform-A-Gram No. A9.**

A One-Piece Face Mill having straight shank with square end drive is designed for use in automation equipment where positive and repetitive location is required. Differ-



ent types are used for milling alloy steel, mild steel, cast iron and bronze, and aluminum, magnesium, plastics and brass. Nelco Tool Co., Inc., Manchester, Conn., or — **Circle No. A10.**

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The SUPER SENSITIVE, SMALL-HOLE, PRECISION DRILLING MACHINE

With capacity of .004" to 5/16" in *all* drillable materials, and spindle speeds from 840 to 9300 R.P.M. infinitely variable in two speed ranges . . . *this* is the machine which the precision industries rely upon to handle the "heart-break jobs."

"for the finest work you do"

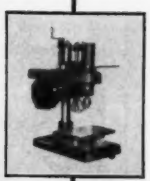
ALSO . . .

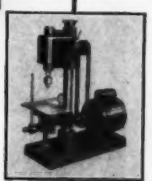
Three companion drills, each built to the same accuracy but differing in drive, speed range, and clearances, to cover the full range of special precision requirements.

AND A TAPPER . . .

with capacity from .034" x 120 to ¼" x 24 . . . and a "reserve of accuracy."

2488





You will want full information about the Hamilton Line of precision drilling and tapping machines. And we will be glad to furnish it.

Ask for our **FREE BULLETIN NO. 2488**

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832 South Ninth Street
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USE IT WITH CONFIDENCE

CIRCLE INFORM-A-GRAM KEY NO. 107

economically priced press room equipment

DURANT Ram Scrap Choppers

Operated by press ram, independent of the die. Tool steel blades. Easily installed in any position only two bolts necessary.

Model	Max. Stock Width	Thick.	Price
M 1	3"	.062	69.
M 2	6"	.062	95.
M 3	10"	.100	165.
M 4	12"	.100	195.
M 5	16"	.100	250.

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DURANT Tool Supply Co.

PROVIDENCE 3, RHODE ISLAND

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UNIVERSAL

HAND TAPPER

For accurate hole-tapping without tap breakage, this Hand Tapping Machine is a "must" for every tool and die shop and toolroom. You can tap holes at any point in work within area of machine table. Quick-change spindles hold taps. Ready for instant use. Write for Bulletin TE4-102.

The Producto Machine Co.
970 Housatonic Avenue
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Better finish . . . greater accuracy . . . lower tool cost! *Write today for specifications and prices.*

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Carbide Reamers • Form Tools

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CIRCLE INFORM-A-GRAM KEY NO. 1083

JOHANSSON GAGING EQUIPMENT

Assures You Precision to the Finest Degree to Meet Your Requirements —Backed by the Name Supreme in the World of Measurement

GAGE BLOCKS

(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant.

INTERNAL INDICATORS

(for inside measurements .155 to 24 inches). Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.

MIKROKATOR

(Amplifier—for outside measurements) Graduations .0001 to .000001 or .01M to .0002M.

OTHER JOHANSSON PRODUCTS

Micrometers, Snap Gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators, Interferometers, Plugs, Rings and Special Gages.

C E J MIKROKATOR 502-E

Mikrokator No. 502-E is a precision instrument for dimensional measurements.

It is provided with a mechanical, frictionless amplification device without sliding bearings or gears and there is no play, wear or binding.

The purpose of the instrument is to give accurate measurements both in mass production checking and in checking individual parts.

The instrument is made in three different designs and in both inch and millimeter.

Cat. No.	Range	Graduated	Shaft Diameter
502-E-2	.016	.0002	⅜"
502-E-4	.004	.00005	⅜"
502-E-5	.002	.00002	⅜"
502-E-6	.0012	.00001	⅜"

Write for Literature

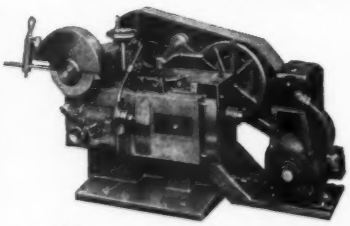
C. E. JOHANSSON GAGE CO.

A DIVISION OF SWEDISH GAGE CO.

10641 HAGGERTY AVE. • BOX 4086 NORTHEASTERN STATION • DEARBORN 1, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1084

CUT MAINTENANCE COSTS WITH WARDWELL "35T" GRINDER



This money saving machine sharpens metal saws in gangs — as many as 150 saws .015" thick at one time, including slitting and screw slotting saws and milling cutters up to 5½" diameter. Completely automatic. Just start machine — it does the rest.

Save money and make money with a Wardwell 35 T Saw Grinder.

WARDWELL

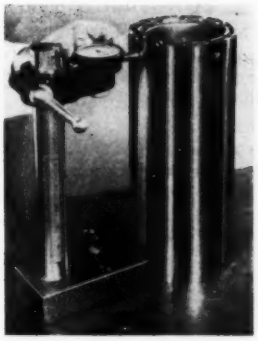
3809 Ridge Road
Cleveland 9, Ohio

Write for Bulletin 35 T

MAKER OF LARGEST LINE OF SAW AND TOOL SHARPENING MACHINES

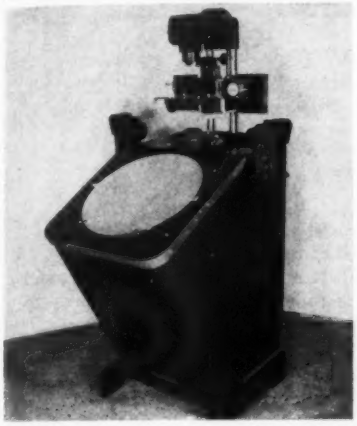
CIRCLE INFORM-A-GRAM KEY NO. 1085

Inspect Accuracy of perpendicular surfaces with the Trans-Square. This combination of master square accuracy and the convenience of direct measurement, provides assured measurements when used with a reliable surface plate. Height is adjustable from 3" to 12" on the graduated column. The DoAll Co., Des Plaines, Ill., or — **Circle No. A12.**



Orient, Feed, and Count a variety of shapes at high speeds with a parts-feeder. Disc-O-Matic handles ball bearings, ball bearing races, needle bearing races, and needle bearings. It can be used to feed parts into other machines, for straight counting, or batching. U. S. Engineering Co., 40-21 22nd St., Long Island City, N. Y., or— **Circle No. A15.**

A Large 18" Dia Image Screen and duplex operational features are offered on the Big Twin Eighteen model optical comparator. The duplex design feature permits this comparator to be used either as a vertical



or horizontal model to suit various applications. The image is geometrically correct over the entire screen area. Portman Instrument Co., Town Dock Rd., New Rochelle, N. Y., or — **Circle No. A13.**

A Process and Tool for production of fiber-glass laminates reduces both labor and material costs. The Rand Fiber-Resin depositor sprays activated resin and chopped fiber-glass

strands simultaneously. It will deposit up to 15 lbs of high strength laminate per min, and is designed for operation by one man. Rand Development Corp., Cleveland, or — **Circle Inform-A-Gram No. A14.**

Recent changes and additions provide many bonus features.

Unobstructed perimeter (work from any side!)

Six Wheel Models

Capacities to 5,000 pounds.

LIFT LOWER TRANSPORT with PORTELVATOR®

The Handy HAMILTON Portable, Elevating Table

3 table surfaces 4 point support

Four Wheel Models

Special Designs too

More Service for Less Money than Any other unit of equipment

A portable, height adjustable, steel table-truck-work bench! Used for die transfer, machine feeding, assembly (at *best* height, in *best* light). For lifting, lowering, transport of all compact, heavy loads. Saves "handling" accidents to both men and materials. Saves minutes for men wherever used.

Write* for NEW, FREE Bulletin No. P-2408

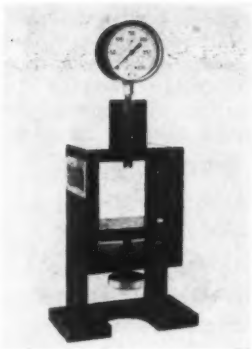
* ADDRESS

THE HAMILTON TOOL COMPANY
832 South Ninth Street
HAMILTON, OHIO

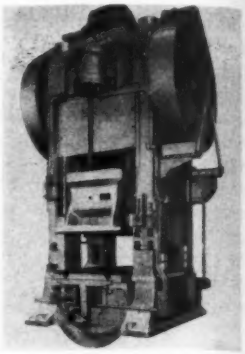
IT'S A Hamilton Tool
USE IT WITH CONFIDENCE
2408

CIRCLE INFORM-A-GRAM KEY NO. 109

A Hand Operated Tester was designed for accuracy and to spare larger testing equipment in low capacity compression testing of materials. Model CT-134 has a capacity load of 300 lbs, and the load measuring system is separated from the load applying system. Steel City Testing Machines, Inc., 8817 Lyndon Ave., Detroit 38, or — **Circle No. A16.**



A Mechanical Double Knuckle Joint Press permits multiple coining and the coining of large size or widely separated parts. This double knuckle arrangement produces uniform two-point ram pressure for heavy tonnage operations, on a 48" x 84" bed. E. W. Bliss Co., Press Div'n, Canton, Ohio, or — **Circle No. A17.**



FINE CUTTING TOOLS by *Eclipse*

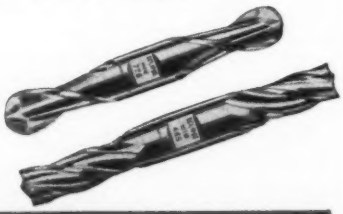
Since 1913 Eclipse has been consistently and conscientiously serving many companies in widely diversified fields of production. Each of these companies has found that "Engineered by Eclipse" is assurance of genuine quality in end cutting tools.

- High Speed Steel Cutters
- Carbide Tipped Cutters
- Core Drills
- Inserted Blade Cutters
- Multi-Diameters
- Back Spotfacers

and remember . . .

Eclipse now has a complete line of Precision End Mills. Ground from the solid, Eclipse End Mills insure longer tool life, finer finishes and lower production costs.

- Write for Counterbore Cat. No. 51
- Write for End Mill Cat. No. 56

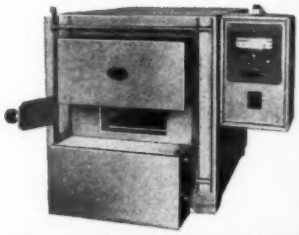


ECLIPSE COUNTERBORE COMPANY
DETROIT 20, MICHIGAN
END MILL DIVISION—NORTH BRANCH, N. J. (ADDRESS BOX 97, RARITAN N. J.)

FOR CATALOG NO. 51 CIRCLE INFORM-A-GRAM KEY NO. 1101

FOR CATALOG NO. 56 CIRCLE INFORM-A-GRAM KEY NO. 1102

Electric Bench-Type Furnaces have been announced by Thermo Electric Mfg. Co., 474 Huff St., Dubuque, Iowa. Type 1800 furnaces have the same chamber dimensions,

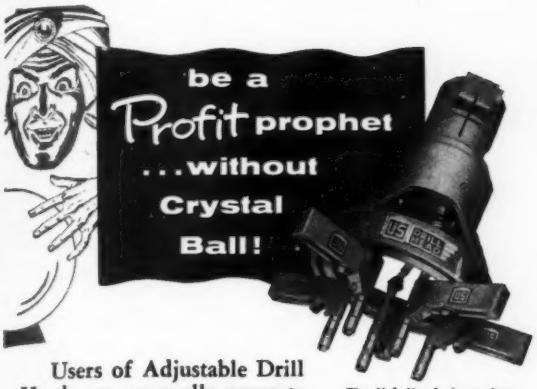


case size, and general construction, but differ in power requirements and top temperatures limits. All models are for direct across-the-line operation. **Circle No. A18.**

Cut Dressing Costs with the Ascoblast tool. Because Ascoblast contains over six carats of small whole diamonds set in a hard, durable matrix, it is recommended for use on coarse, hard wheels where ordinary diamond wear is excessive. It can be set in any holder accommodated by existing equipment or may be used as a hand tool set in a ½" x 8" shank. Anton Smit & Co., Inc., 111 8th Ave., New York 11, or — **Circle Inform-A-Gram No. A19.**

Bore Large Assemblies or small individual pieces with a precision borer announced by Greenlee Bros. & Co., Rockford, Ill. The S-7 Hydro-Borer is designed for mount-

ing with special workholding fixtures or large assembly jigs. Dimensions include 1¾" spindle and 6" stroke length. It is equipped with manual, solenoid, or air-operated controls. **Circle No. A20.**



Users of Adjustable Drill Heads are unusually accurate in anticipating profit pictures—they regularly figure lower and *more dependable costs.* That's because these high-quality heads—priced right to start with—usually cost less to maintain, less to operate.

The U-1 Head shown has 8 drivers, ¼" drilling capacity in cast iron, 6" diameter drilling area. With 2 spindles and Erickson chucks, it costs only $260.

And that's because ALL U. S. Heads of this type have these plus features:

SHAVED GEARS
SPECIAL UNIVERSALS
ALUMINUM BODY CASTING
GREATER BEARING AREA
QUICK CHANGEOVER
SLIP SPINDLE PLATE

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Individual Lead Screw Multiple Tapping Heads

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BURNS STREET • CINCINNATI 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1111

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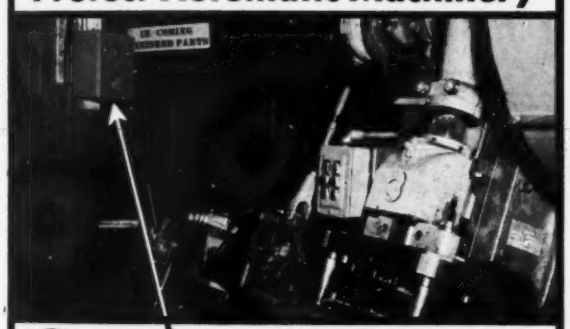


Sperry monitron's sensitive control protects this high-speed punch press making appliance parts

Not a chance of damage from pile-ups, misfeeds, dull tools, oversize stock, or faulty lubrication. Monitron stops the machine instantly—*before* damage can be done.

Monitron protection can be easily installed on electrically driven presses, conveyors, pumps, automatic machine tools, etc. It gives your machine every attention, yet needs no attention itself. Install Monitron and let it save man-hours, increase your production!

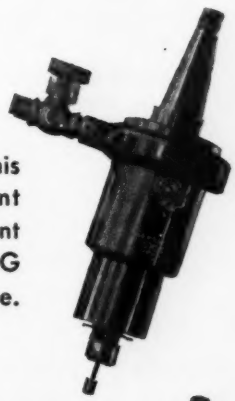
For complete information, just attach this advertisement to your company's letterhead, give your name and title, and mail to:

SPERRY PRODUCTS, INC.

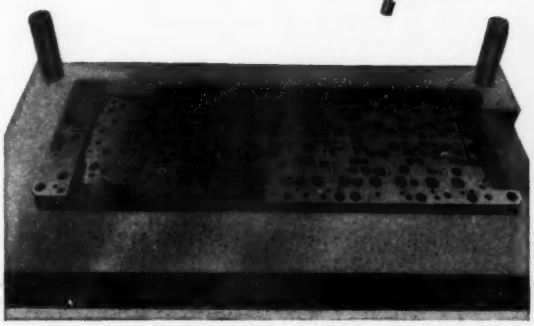
403 Shelter Rock Road, Danbury, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1112

HOLES JIG GROUND with Vulcanaire



Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.



A seven station die from Vulcan's contract Tool Room (Your Tool Room in Dayton).

Standard sized punches and buttons were used. But since forming and piercing operations were involved, hardening of the sections was necessary followed by JIG GRINDING. Result: Close tolerances held easily and perfect progression throughout — another satisfied customer.

*Vulcanaire equipment pays for itself on the first job.

Borrow our instructive 11 minute movie on Jig Grinding.

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DIES • SPECIAL MACHINES • VULCANAIRE JIG GRINDERS • MOTORIZED ROTARY TABLES • BREHM "SHIMMY" AND RELATED DIES • AUTOMATION

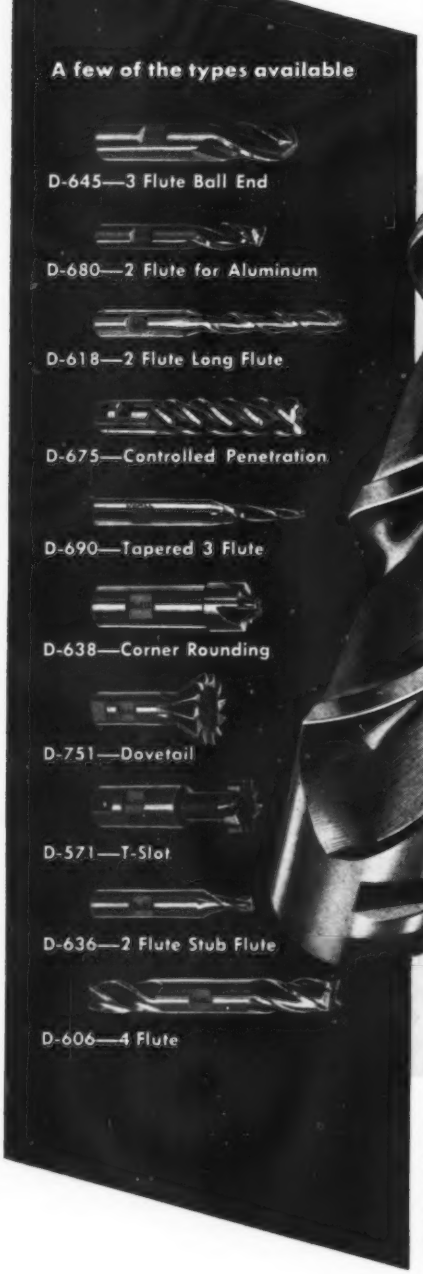
VULCAN TOOL COMPANY
741 Lorain Ave., Dayton 10, Ohio

VULCAN tools

CIRCLE INFORM-A-GRAM KEY NO. 1113

COMPARE this DoALL 3-flute end mill...

A few of the types available

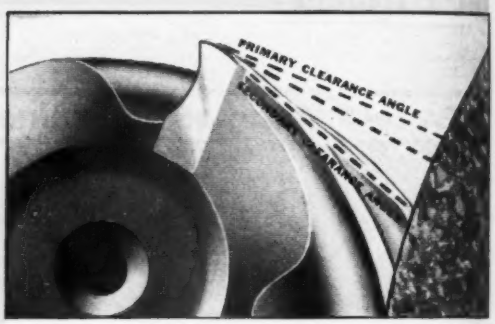


Three flute end mills with 2" diameter and 2" shank in 4", 6", 8", and 10" flute lengths—another case of how specials are *standard* at DoALL.

it gives you the plunge-cutting advantages of 2 flutes ... the fine finish of 4 flutes!

You can greatly cut your milling time and costs with this DoALL End Mill. One fast operation eliminates the need of both rough and finish cuts. No extra cost for this DoALL double-feature advantage, either. Also available with ball ends.

Turning out your work faster is only the start of it. Like all DoALL End Mills, it will turn out the work longer as well. Special high-speed, high-strength DoALL steels is one good reason. So are all these others: DoALL End Mills are completely finish ground with polished flutes after hardening and have a high helix angle which promotes smoother cutting . . . spiral flutes are hollow ground for better chip removal and less abrasive action.



Radial ground double back-off design gives maximum strength on the cutting edge for highest speeds and feeds.

one of over 600 sizes — DoALL stocks many standards which are specials with others!

No compromising on *what* you want and *when* you want it with DoALL End Mills. Your needs are met completely and quickly from your nearby DoALL Sales-Service Store, where top stocks totaling over 600 different types and sizes are within one-call reach. Profit from this specialized end mill service now!

CT-37

FREE FOR YOU! The end mill speed selector chart that makes sense by saving time and chance of error! DoALL has put recommended speeds in *revolutions per minute*. A glance gives you your setup answer for every job. No cost just call your DoALL Store.

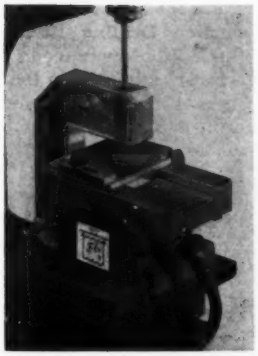
Find Your DoALL Store In The 'Yellow Pages'

THE DoALL COMPANY, Des Plaines, Ill.

Call Your DoALL Service-Store

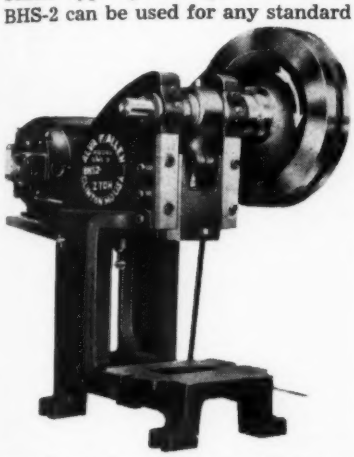
CIRCLE INFORM-A-GRAM KEY NO. 112

Size and Finish Holes by the ballizing process using the Ball-O-Matic universal workholding fixture. This fixture accommodates a wide range of parts for ballizing holes of 1/16" to 1/2" dia. It can be used on an arbor press, drill press, vertical broach, etc. Industrial Tectonics, Inc., 3686 Jackson Rd., Ann Arbor, Mich., or — **Circle No. A21.**



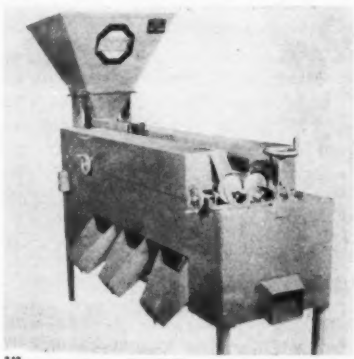
A Continuous Spiral Point with multiple chamfer sections is a feature of the Regal Jet tap. This forces the lubricant to the cutting edge, extending the life of the tap. It also pushes the chips ahead of the tap eliminating the problem of chips clogging the flutes. Beloit Tool Corp., Beloit, Wis., or— **Circle No. A24.**

Two-Ton Capacity Plus 7" High Shut Height are features of a power bench type punch press. Model BHS-2 can be used for any standard



punching operation, in various materials, within rated capacity. Standard stroke is 3/4", with 1/4" to 1 1/2" strokes also available. Alva Allen Industries, Clinton, Mo., or — **Circle Inform-A-Gram No. A22.**

A Dimensional Separator will make difficult separations that cannot be made by either magnetic or shaker screen methods. The redesigned machine will handle needle-



like parts of different diameters, flat parts or chips from round or block shapes, and dissimilar parts. The Esbec Barrel Finishing Corp., 18 Beech St., Byram, Conn, or— **Circle Inform-A-Gram No. A23.**

Specify Ex-Cell-O standard power units and cut your machine tool lead time

Today's demand for increased productivity, lower per-unit cost, even on relatively short runs, is being met economically by automatic, single-purpose, high-production machines —consisting essentially of a plain base and one or more Ex-Cell-O Quill-Type Hydraulic Power Units.

These standard, self-contained Ex-Cell-O Hydraulic Power Units are now being used for: drilling, counterboring, spot facing, reaming, as well as prime movers for milling equipment. Multiple operations may also be performed.

For the full story on the cost-saving advantages get in touch with your local Ex-Cell-O Representative. Or, if you prefer, write direct to Ex-Cell-O, Detroit.

*Style 22—8-inch Stroke; Style 22-L—12-inch Stroke.

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • TORQUE ACTUATORS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

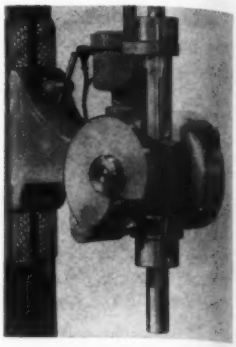
58-21

EX-CELL-O CORPORATION DETROIT 32, MICHIGAN Machinery Division

CIRCLE INFORM-A-GRAM KEY NO. 113

Narrow Staggered Tooth Slotting Cutters for general purpose milling have been announced by Goddard & Goddard Co., 12280 Burt Rd., Detroit 23. WAF Series feature flat-face HSS blades wedged into the cutter body, eliminating blade refacing after sharpening side and top. Widths range from ⅜" to 1" and diameters from 4" to 16". **Circle No. A25.**

For Medium to Large Production Drilling Runs use the Edlund cam feed. Externally mounted to the left side of the spindle sliding arm, it controls the amount of travel (up to 3 3/16"), including rapid advance and feed, and can be used on drilling and tapping machines. Edlund Machinery Co., 50 Huntington St., Cortland, N. Y., or — **Circle A26.**



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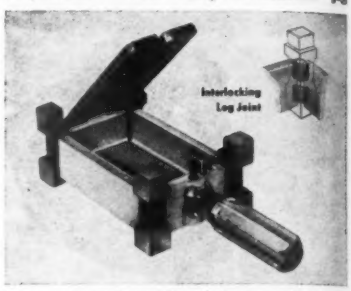
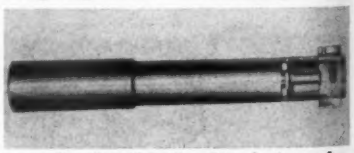
Increase Efficiency and Production using the light-weight Tumble box jig. Because the legs project and protect, head-type bushings may be used on sides, top, or bottom, as required. The easy-to-handle jig



has interlocking leg joints and comes in a range of 47 sizes. Standard Parts Co., 1030 Broadway, Bedford, Ohio, or —
Circle Inform-A-Gram No. A27.

Repair Cracks, Chips, Gouges, Leads, etc. with Plastic Metal, a soft material which can be applied with a putty knife. After hardening, it can be drilled, threaded, machined, ground or sanded, and is used on iron, brass, aluminum, bronze, plastic, and other materials. The A. L. Okun Company, Inc., 109-02 Van Wyck Expressway, S. Ozone Park, L. I. 20, N. Y., or —
Circle Inform-A-Gram No. A28.

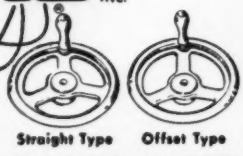
Minimize Setups and expedite adjustment and blade exchanges without removing the bar from the machine with these finishing and roughing bars. A floating mount



permits the chip load to balance between the two cutting edges, producing a smoother surface on precision finishing operations. Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Calif., or—
Circle Inform-A-Gram No. A29.

TOMCO INC.

HAND WHEELS



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USE IT EITHER WAY

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complete with cord, plug, switch ready to use $89.95

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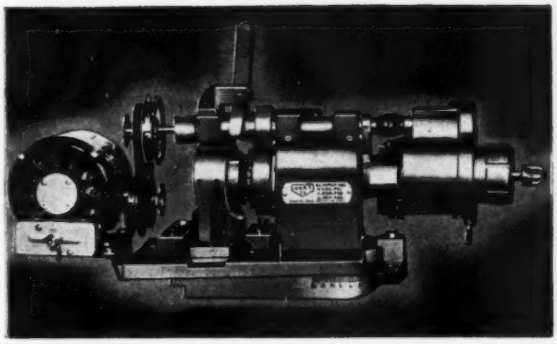
Precision CIRCULARITY GRINDING ATTACHMENT

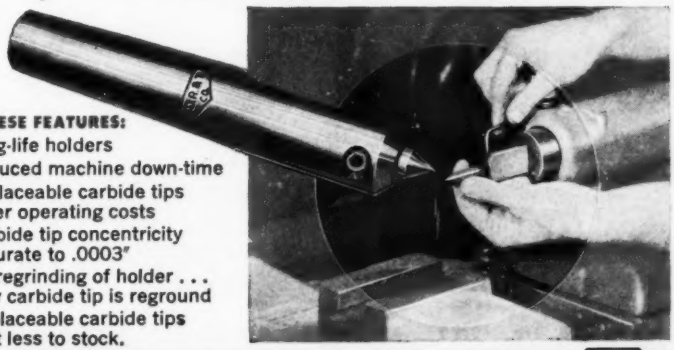


You Can Grind Tools Like These On A DETROIT REAMER CIRCULARITY GRINDING ATTACHMENT

Simple, speedy set-ups on this accurate attachment permit fast and easy grinding of form relief, a combination of form and radial relief, tapered cylindrical and straight cylindrical.

Model 500 Circularity Grinding Attachment is faster—easier to handle—has positive control—greater adaptability—rugged construction—is engineered and built to provide the finest precision work.

Grip-Tip CENTERS—Replaceable Carbide Tips



CHECK THESE FEATURES:

1. Long-life holders
2. Reduced machine down-time
3. Replaceable carbide tips lower operating costs
4. Carbide tip concentricity accurate to .0003"
5. No regrinding of holder . . . only carbide tip is reground
6. Replaceable carbide tips cost less to stock.

DETROIT REAMER & TOOL CO.

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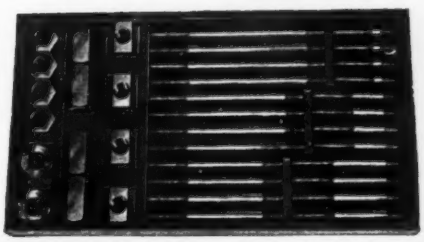
CIRCLE INFORM-A-GRAM KEY NO. 1153

REID Tool Room NEEDS

HANDY SET-UP STUD SETS



Available in 12 different sets in wide range of sizes. Each set contains 24 studs, 4 each of T-Nuts, Coupling Nuts, Hexagon Nuts and Washers. Each item also obtainable separately.

FREE — 74 page catalog listing scores of needed items for tool room. Address

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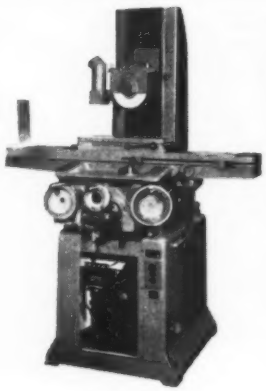
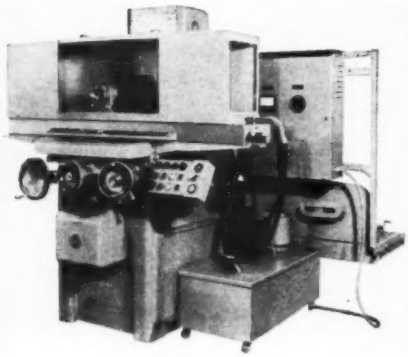
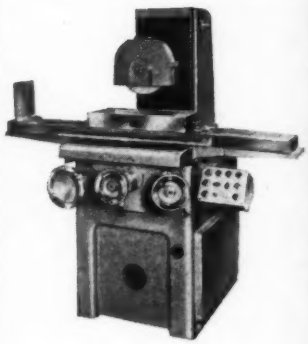


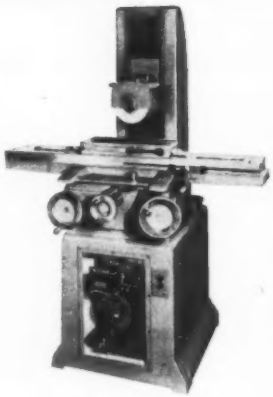
REID Model 618 P
Power Table Power Crossfeed



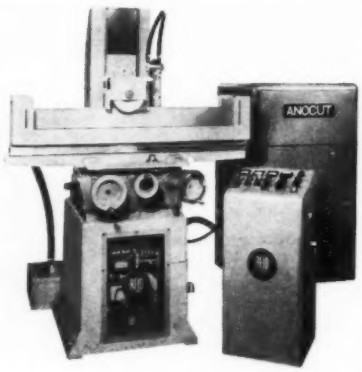
REID Germanium slicing machine



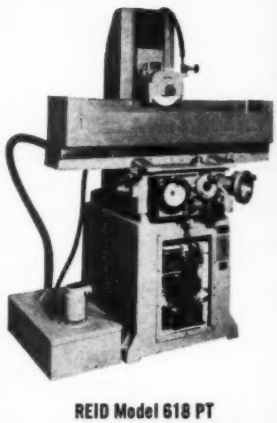
REID-O-MATIC 824
All Electric Production and Toolroom precision surface grinder



REID Model 618 H
Hand operated (Table and Crossfeed)



REID Electrolytic surface grinder



REID Model 618 PT
(Power Table Hand Crossfeed shown with wet grinding attachment)

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REID Precision Surface Grinders meet a wide range of toolroom and production needs. As proof of this versatility REID Grinders are in everyday use in thousands of leading industrial plants.

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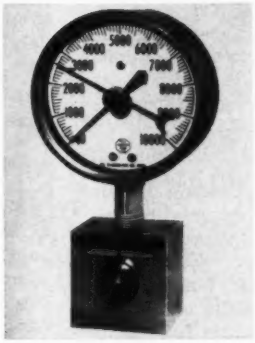
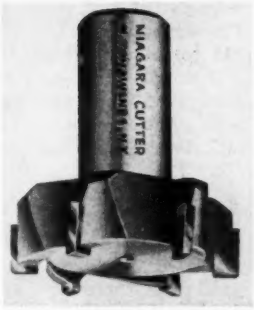
A Total Pressure Gage gives direct accurate reading of total pressure of ram-on-work in presses and other machine tools where controlled pressures are required. It can be used either in a vertical or in horizontal position. 10,000, 20,000, and 100,000 lb capacities are available. Studebaker Hydraulic Products Co., 1733 N. 33rd Ave., Melrose Park, Ill., or — **Circle No. A30.**



Carbide Face Mills come in 3" and 3½" dia with 1¼" integral shank and 4" dia with 2" shank. The short design of the mills brings the cutter close to spindle bearings, thus reducing overhang and strengthening tool support and rigidity. Niagara Cutter Div'n of Bollier-Camerell, Inc., 330 Niagara St., N. Tonawanda, N. Y., or **Circle No. A34.**



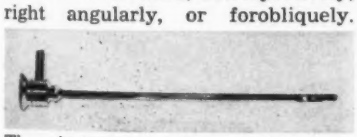
Control Overload Conditions of both fractional and multiple horsepower electric motors with a simplified load switch. It is used for detecting misaligned or dulled cutting

tools in drilling or milling operations, overloaded conveyors, presses, cranes, mills, etc. J.I.C. Electric Co. 19255 W. Davison, Detroit 23, or — **Circle Inform-A-Gram No. A31.**

Spiral Fluted End Mills can be run at slower speeds without injury to the cutting edge. Series 1505 are especially recommended for machining stainless steels, stellite, titanium,

chrome, and other high temperature steels. Fractional sizes range from 1/16" cutter dia to ¾". Atrax Co., 240 Day St., Newington, Conn., or— **Circle Inform-A-Gram No. A32.**

Inspect Hidden Surfaces that the eye cannot see with the Bore-O-Scope, a high precision optical instrument. It gives the inspector a clear view forward, retrospectively, right angularly, or forobliquely.



The instrument is available in sizes from 3/16" OD and in a range of lengths from 8" to longer than 15'. Size Control Company, 2500 W. Washington Blvd., Chicago 12, or— **Circle Inform-A-Gram No. A33.**

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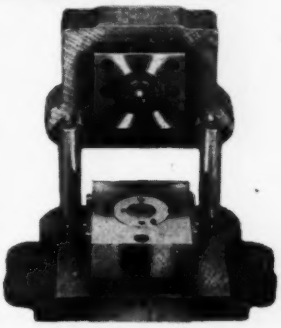

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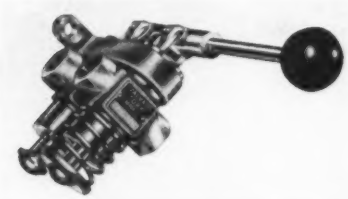
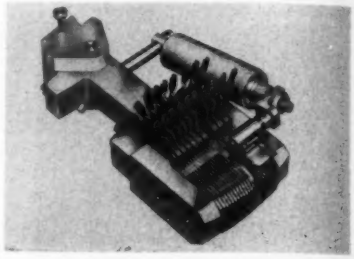


A Microscopically Smooth Finish is possible with an automatic machine using a liquid abrasive process. The automatic method of handling the parts during the abrasive process, and the oscillating air blasting gun which is fed by an infinitely variable pump, eliminate manual adjustment of the parts to

be finished. Different sized components are handled with ease. Lewis Welding & Engineering Corp., Bedford, Ohio. **Circle No. A36.**

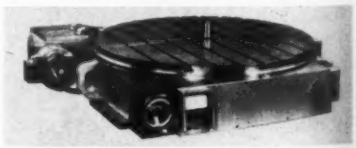
An Automatic Numbering Head is designed for roll marking a 20-digit number into flat workpieces with a permanent indented impression in a curved line. The head is



equipped with a total of 20 indexing levers, in two banks, for manual indexing of all wheels including those which are also indexed automatically by the air tripper. The Noble & Westbrook Mfg. Co., E. Hartford, Conn., or — **Circle No. A37.**

Cutter Changes can be made in less than a minute with the Quick Change Woodruff Keyseat cutter. The cutters are driven by a standard ½" holder which has a positive stop located in the holder. They eliminate setup scrap, and tool changes can be made by unskilled help. Quality Tool Works, Inc., 760 S. Market St., Waukegan, Ill., or — **Circle Inform-A-Gram No. A38.**

An Index Table, electronically controlled by tape or card, excels in permanent accuracy and production efficiency by positioning to one sec of arc automatically. It can be used with any standard or non-standard



machine tool of sufficient capacity. Used independently, it serves as a precision inspection machine. Superior Machine and Engineering Co., 1930 Ferry Park, Detroit 8, or — **Circle Inform-A-Gram No. A39.**

Allison
Abrasive Cutting Wheels

Abrasive Cutting Know-How

Know-How is just as vital to top performance in abrasive cutting as in any other machine tool operation

PROBLEM: Cut ¾" Bars of Cobalt-Base, High-Temperature Alloy at High Production Rates ... Maintain Length Tolerance with Burn-Free, Burr-Free Cuts

SOLUTION: An ALLISON Field Engineer (all are abrasive cutting specialists) prescribed the particular ALLISON wheel that met these rigid requirements.

RESULT: 576 pieces per hour, cutting 8 bars at a time as pictured above... length tolerance consistently held well within ± .015"... All cuts burn-free, burr-free!

This aircraft parts manufacturer had been unable to hold length tolerance in cutting these high-temperature alloy blanks for forging jet engine blades until he availed himself of ALLISON Abrasive Cutting Know-How and used the prescribed ALLISON wheel.

Allison Recommendations Pay Off, whether you cut titanium, stainless steel or other high temperature metals. ALLISON Abrasive Cutting gives you Fast, Economical, Quality Cuts.

ALLISON wheels are available in a tremendous range of formulations—rubber or resinoid bonds—3" to 34" diameters—.006" to 3/16" thick—

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Immediate shipment from factory stock, ⅜" to 3" diameters by eighths.

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Any decimal diameter — any length. Mirror finish surface to gage tolerance.

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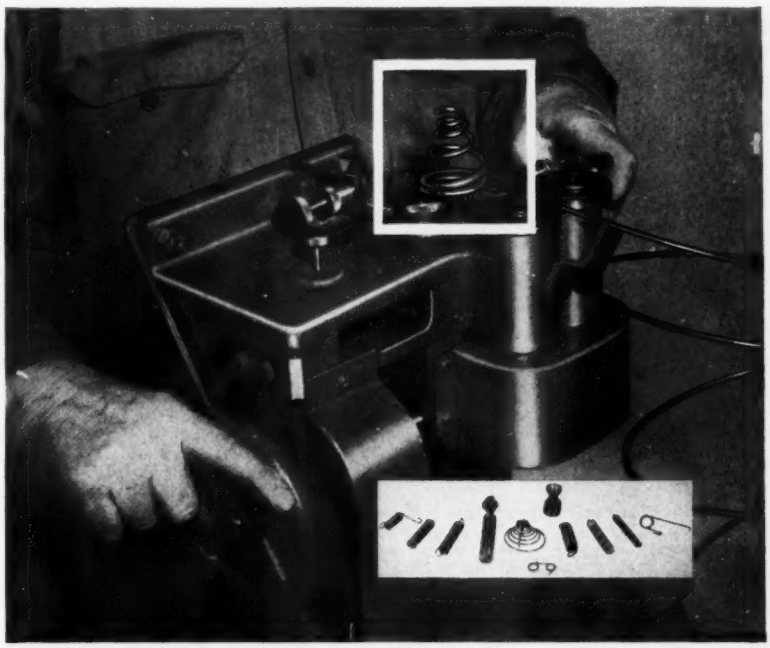

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Please send information and prices on Perkins Spring Coiler.
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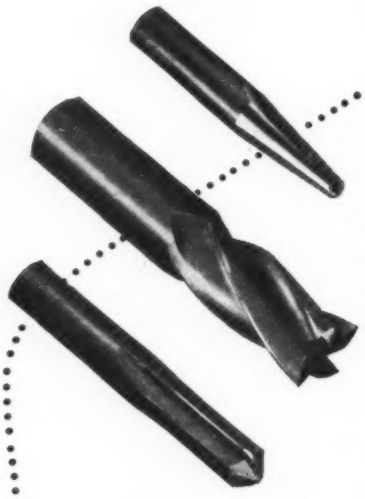
new FORD solid carbide END MILLS



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All Ford end mills are *precision machine ground from the solid* . . . which insures uniformly accurate flute form and a constant relief angle. On your job, that means more parts per grind. So you save labor on grinding and tool changing. You save on replacements. You save on downtime. What's more, there's less time per part, more parts per hour, fewer rejects. Available in 11 types . . . all standard, and *available.*

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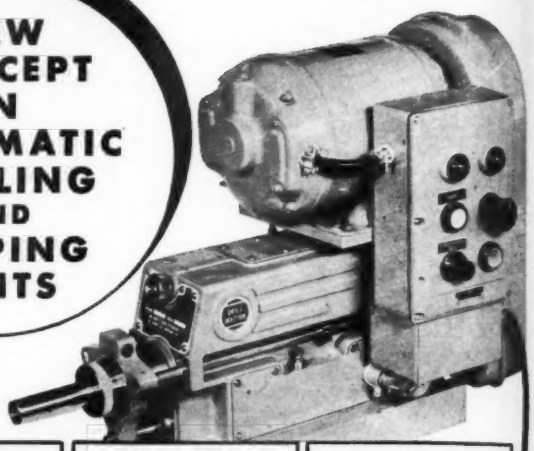

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AUTOMATION | DRILLMATION | TAPMATION

Drillmation's hydraulic, locked-circuit feed Drilling and Tapping Units are the finest and most completely self-contained of any similar unit available today. Drillmation also offers more essential and exclusive features. Write TODAY for literature.

12 ESSENTIAL Exclusive FEATURES in 1 Unit

- **DULL TOOL CONTROL** Unit will withdraw tool from work and indicate to operator when tool becomes dull.
- **RAPID TOOL CHANGE** Tool may be replaced without changing the controls.
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- **COMPLETELY AUTOMATIC** Enclosed electric controls. Unit is "Fail Safe".
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- **PRODUCTION MACHINE** Mount in any position. Quiet operation. Self lubricating.

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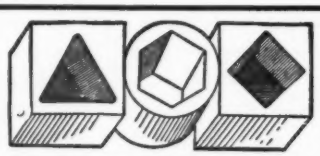

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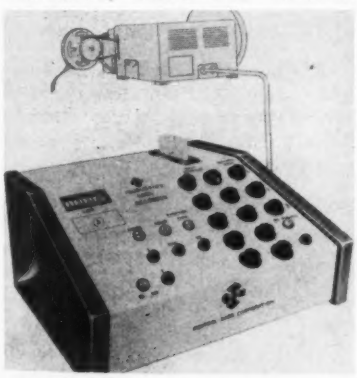
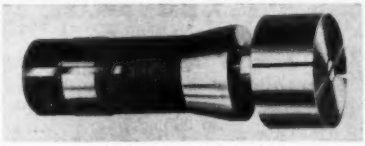
Peel and Beam Shear Strength is provided in a series of heat curing supported composite film adhesives for honeycomb sandwich construction. Scotch-Weld Brand bonding films AF-200 and AF-201 eliminate the need for sandwich core priming which increases production of bonded sandwich components, reduces fabrication costs, etc. Adhesives, Coatings, and Sealers Div'n, Minnesota Mining and Mfg. Co., 423 Piquette Ave., Detroit 2, or — **Circle Inform-A-Gram No. A41.**

A Data Processing Device, Production Data Recorder, was produced for specialized production information handling. It will accept a variety of information, select and combine



pertinent data, and produce a record on punched paper tape, punched cards, or magnetic tape. Control Data Corp., 501 Park Ave., Minneapolis, or — **Circle No. A42.**

Save Time and Money and boost production as much as 300% with the basic Empire internal collet. It will accommodate many pads which can



be removed and replaced with accuracy. It can be used in threading or tapping operations where collapsible taps or die-heads are employed. Royal Products, 78 Union St., Mineola, L. I., N. Y., or — **Circle Inform-A-Gram No. A43.**

Use JF Series Recessing Tools for automatic chamfering of both sides of drilled or reamed holes. They can be applied to the manufacture of any product whose production qualities warrant the use of multiple drilling

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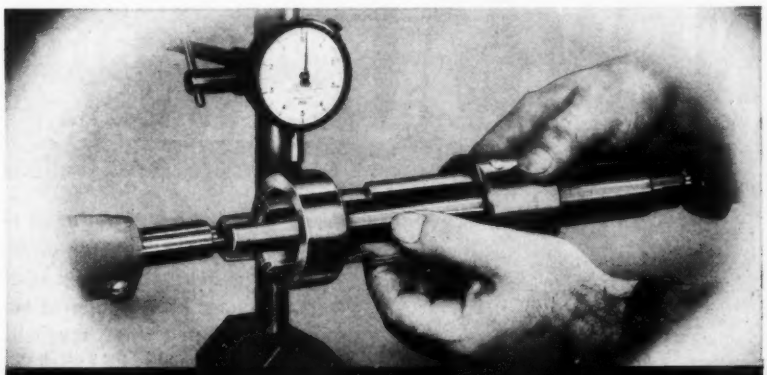
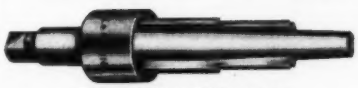


PRECISION at your fingertips

LeCOUNT EXPANDING MANDRELS



TYPE "A" STEP JAW
Extra wide range

For all arbor applications the LeCount Type "A" universal expanding mandrel offers the greatest expansion and covers an extra wide bore range. It provides accuracy and concentricity to .0005" or .0002" T.I.R. conveniently and economically. Only 11 precision tools provide for every bore size from ⅜" to 7".

TYPE "B" STRAIGHT JAW
Wide range

Count-Centric* Type "B" mandrels with guaranteed accuracy to .0005" or .0002" T.I.R. offer extra long bearing surface over a wide bore range. 22 precision tools provide for every bore size from ⅜" to 7¼" without change of jaws.

TYPE "M" MICRO-MITE*
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Micro-Mite* expanding mandrels are miniature duplicates of the Count-Centric* straight jaw mandrels designed to enable precision instruments and electronic manufacturers to achieve miniaturization without the cost of special holding devices. Only 8 standard tools provide every arbor from ¼" to ½".
In addition to the many standard types of Count-Centric* expanding mandrels LeCount is equipped to design and produce a wide range of special mandrels for unusual bores, including threaded, splined, polygonal and plural diameters. Send blueprints or samples for prompt quotation.

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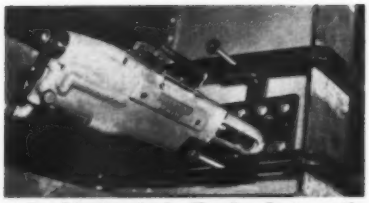
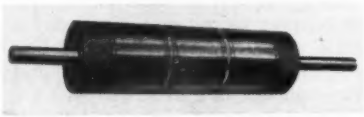
CIRCLE INFORM-A-GRAM KEY NO. 121

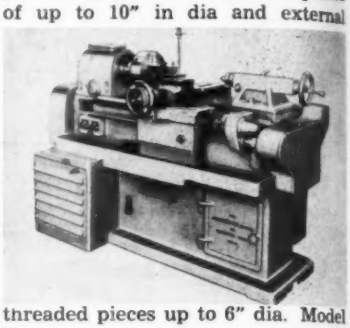


A Mechanical Feed, Automatic Drill combines machine tool precision with portable tool convenience. It is designed for applications where drilling is done at several points on a large workpiece, and may also be used with permanent fixtures, where work would be brought to the tool. Rated capacity is 1½" in steel, and larger in aluminum and softer materials. Buckeye Tools Corp., Springboro Pike, Dayton, Ohio, or — **Circle Inform-A-Gram No. A45.**

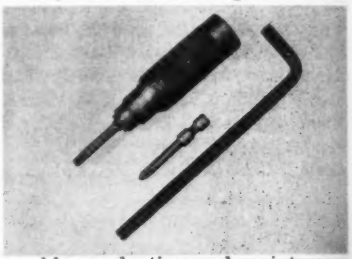
Non-Electric Magnetic Flat-Face Rolls can be used as head pulleys or tail pulleys, for holding, controlling or elevating ferrous parts, metal pieces, etc. Magna-Rolls are available in sizes from 2½" dia through 30" dia and each obtainable in precisely the magnetic strength and depth of field required for a given application. Eriez Mfg. Co., Erie, Pa., or — **Circle No. A46.**



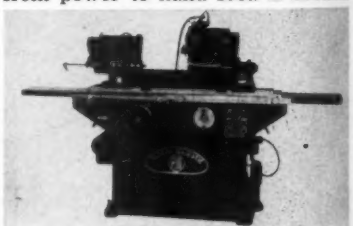
A Single Point Threading Lathe is an automatic model capable of producing internal threaded pieces of up to 10" in dia and external threaded pieces up to 6" dia. Model B has a 24" capacity between centers with maximum swing over the cross slide of 6" and a bed swing of 14". The James Coulter Machine Co., 136 James St., Bridgeport, Conn., or — **Circle Inform-A-Gram No. A47.**



A Safe-Torque Hand-Operated Screw Driver is designed for applications requiring a specified torque. Built with a roller drive clutch for applications in the range of 0 to 25 in-lbs, it is ideal for precision assembly production and maintenance jobs where air-or-electric-powered tools are unavailable. Scully-Jones and Co., 1901 S. Rockwell St, Chicago 8, or — **Circle No. A48.**



A Universal Grinder features an electro-magnetic power transmission which permits immediate transfer from power to hand feed if needed. The No. 2 grinder has a 12" swing by 30" table travel, and the table feeds are between 3 and 50 ipm. Parker-Majestic, Inc., 147 Joseph Campau, Detroit 7, or — **Circle No. A49.**



NEW 50 TON O.B.I. PRESS-RITE PRESS

Deflection is reduced to minimum even under heaviest drawing and blanking operations through the specially designed PRESS-RITE frame.

PRESS-RITE Features Include . . . Built-in positive single stroke mechanism for maximum operator safety. Faster 4 point clutch with easily replaceable hardened inserts. Clutch plate has patented synchronizing blocks for full positive engagement of clutch key with flywheel. Extra heavy ram slide has full Vee ram ways.

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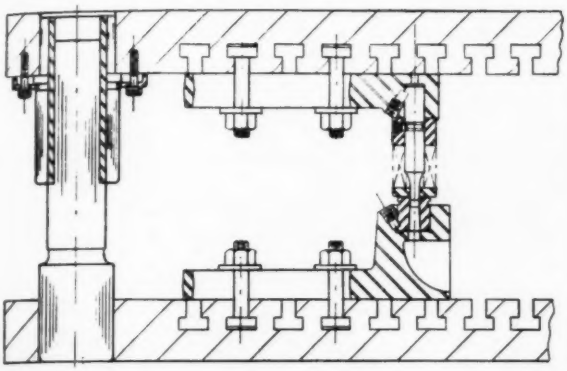
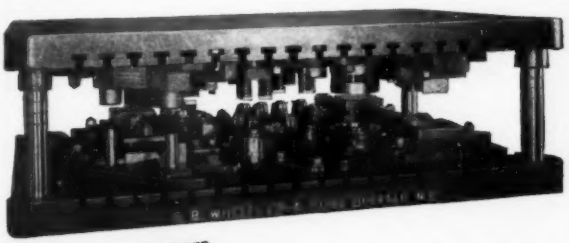
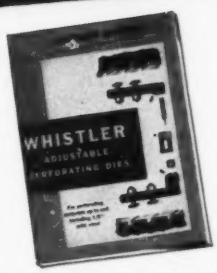
ADJUSTABLE DIES by WHISTLER

• Operate like a single purpose die • Easy to set-up and make changes • Interchangeable and re-usable parts always ready for a new job • Reduce die costs to a new low • Pierce holes in any desired arrangement of shapes and sizes • Precision piercing of materials to ¼" thick steel.



Above: Sectional drawing of a Whistler adjustable punch and die unit assembled in T-slot die set. **Below:** A completely assembled Whistler adjustable die ready for the press.





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Direct Factory Representatives Located in Principal Industrial Areas

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Correctly,
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- ★ **Brass cylinder, aluminum end castings, Hy-Car piston cups.**
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or pushbutton, eliminating need for highly skilled operators. Tap stroke is adjustable from ⅛" to 2", and tapping speed is infinitely variable. Milman Engineering Co., 1831 Pontius Ave., Los Angeles 25, or — **Circle Inform-A-Gram No. A50.**

Remove Metal on Flat Surfaces Faster than by planing or milling, and get a grinding finish with the 18" face grinder now available with power feed to the table. Box-type

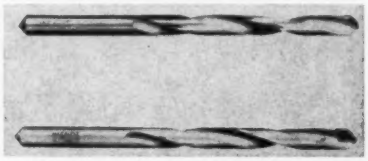
way construction provides maximum rigidity for accuracy in grinding any flat or square surface, as well as providing large bearing surfaces. Abrasive Machine Tool Co., Providence, or—**Circle Inform-A-Gram No. A51.**

Cut Sheet Metal with the modernized ring and circle shears which will cut circular discs, holes, rings, irregular out-lines, and straight lines in blanks of any shape. Features include adjustable swing and

slitting gages and an inclined lower cutter to keep offal material flat and usable. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, or — **Circle No. A52.**

An Outside Micrometer Caliper of 1" capacity combines strength, rigidity and lightness with fine precision features. The 436 Series is specially forged and ribbed for extra strength and tapers to the anvil to permit use in narrow slots and tight places. The L. S. Starrett Co., Athol, Mass., or — **No. A53.**

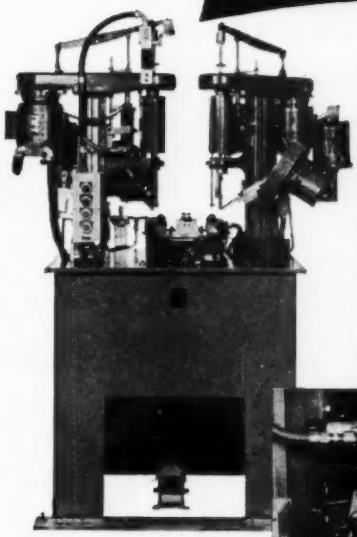
Carbide-Tipped and Solid Carbide Twist Drills for non-metal are designed for working in plastics, resinoids, pressed fiber, hard rubber,



and others. All surfaces of the solid carbide drills are diamond ground to provide faster cutting and cooler running. Wendt-Sonis Co., Hannibal, Mo., or — **Circle No. A54.**

JOB NUMBER SP-9514

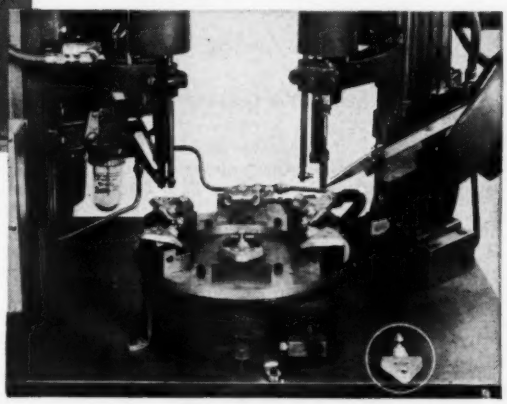
DPS "built-in" mechanical skill



● Pictured is a specially designed machine used for assembling

REAR VIEW MIRROR SWIVEL BRACKETS

The machine consists of two driving heads with automatic feeding devices with an indexing type fixture . . . The operator simply preloads the component parts of the assembly into the dial, and as the dial indexes two screws are driven into the swivel pressure plate at proper tension for adjusting the mirror.



● No mirrors? O.K. No matter what you make, if there's parts to be assembled you'll find the mechanical answer in D.P.S.

POWER SCREWDRIVERS
SELECTIVE PARTS FEEDERS
SPECIAL ASSEMBLING MACHINES

specially adapted to serve your individual feeding and assembling needs at a higher production rate, lower cost, and with greater earnings.

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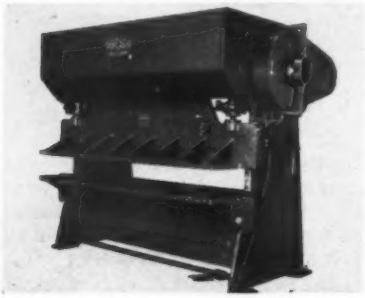
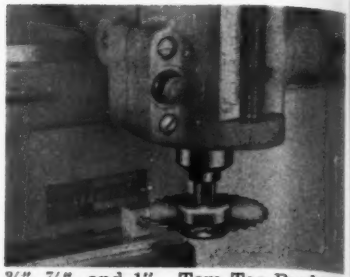
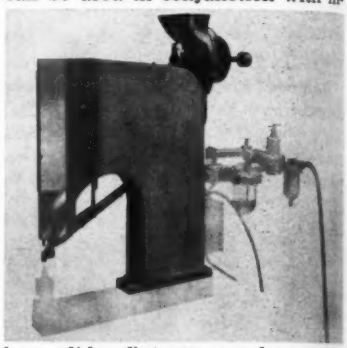
Produce Light Stampings with a modified design of the light-duty press brake. The machine is provided with a wide bed and ram giving a die area of 36" x 77", has a stroke of 3", and a speed of 40 strokes/min. The 30-ton capacity machine is of all-welded steel construction. Dreis & Krump Mfg. Co., 7400 S. Loomis Blvd., Chicago 36, or **Circle Inform-A-Gram No. A55.**



Save Tooling Cost and Set-Up Time using a circular saw and cutter holder on any spindle power machine such as miller, lathe, or drill press. It is adaptable up to a 4" dia and any thickness up to 3/16", and can accommodate five different standard hole sizes of 1/2", 5/8", 3/4", 7/8", and 1". Tom-Tec Products, 4108 W. Burbank Blvd., Burbank, Calif., or — **Circle No. A56.**



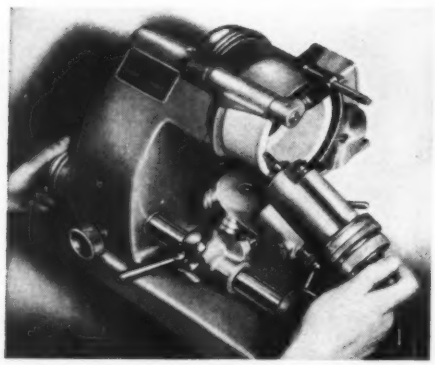
Pneumatic Riveting Machines that measure only 3¼" in width, can set tubular steel rivets up to 5/32" dia and ¾" long on as small as ¾" centers. The bench type model 56 can be used in conjunction with in-line slide fixtures or by rotary transfer tables for progressive high-speed production assembly operations. Milford Rivet & Machine Co., Milford, Conn., or— **Circle Inform-A-Gram No. A57.**



A Stock Reel is suitable for materials up to 10" in width and handles coils from 10" to 22½" ID, and up to 40" OD. Model ACR-10-40 is arranged with a loop control mechanism, reversing switch, and ½-hp motor. The expansion and retraction of the cross arms of the reel to vary the inside diameter is done by power and not manually. U. S. Tool Co., Inc., Ampere, N. J., or — **Circle Inform-A-Gram No. A58.**

DECKEL **Single-Lip Cutter Grinder**

Low Cost Resharpening With Extreme Accuracy



● **Reduces Expensive Inventory** ● **Operated By Semi-Skilled Workers**

The precision performance of the SO Single-Lip Cutter Grinder can save you time, space and money — while improving the quality of your machining operation. A simple grinding job — even by semi-skilled workers — will accurately shape or resharpen all types of single-lip cutters, tracing styles, center bits and straight-fluted two- or three-lipped milling cutters. The entire work-holding fixture is mounted on a tubular slide permitting coarse and fine longitudinal adjustments. Two swivel bearings on the base of the work arm and an adjustable slide on the index head provide equally fine settings for all desired tool profiles, relief angles and off-center radii.

This Deckel Cutter Grinder lets you reduce expensive inventories of finished tools — stock only semi-finished ones. Worn or damaged single-lip cutters are easily reconditioned and saved from the scrap heap. Designed as a bench machine, it takes little space, can be conveniently installed. Chances are it can do several jobs for you right now. It pays its own way in no time.

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FASTEST, BEST MEANS OF CUTTING METALS

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THE TANNEWITZ WORKS

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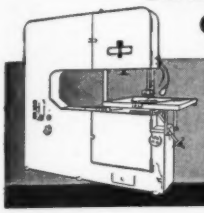

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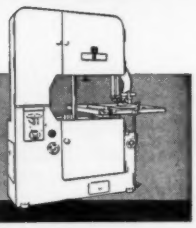
for CONTOUR SAWING, FILING, POLISHING
The smoothest, fastest, most trouble-free Di-Saws on the market. Write for bulletin.



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This catalog shows the most complete line of work holding tools available anywhere for production on milling machines and drill presses . . . angle vises . . . drill press vises . . . swivel machine vises . . . adjustable angle plates with or without swivel bases . . . production vises . . . heavy duty angle vises . . . rotary and indexing tables for use on milling machines and drill presses . . . milling attachments for milling on lathes.

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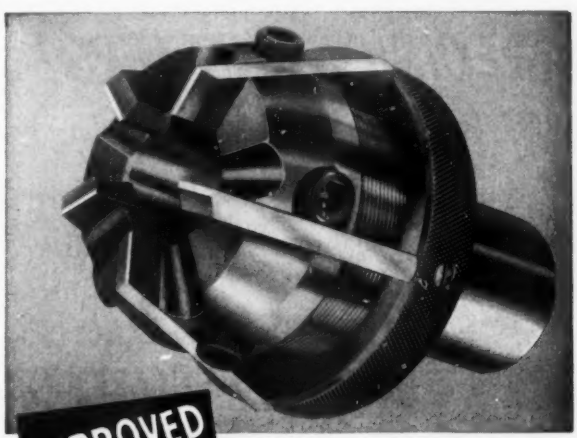

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There is a size and style Genesee for every hollow milling job. Standard sizes from 0 to 2", standard with straight or Morse Taper shanks carried in stock.

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566 HOLLENBECK ST. • ROCHESTER 21, N. Y.
Adjustable Hollow Mills • Facing and Counterboring Tools • Special Production Tools

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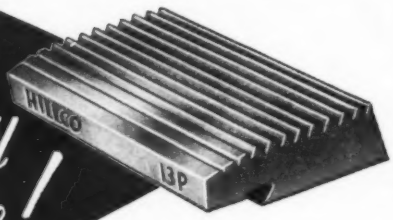
"HILLCO" TANGENT CHASERS

We think you'll agree!



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ACME MACHINERY DIVISION
1203 West 65th Street • Cleveland 2, Ohio

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MADE TO YOUR EXACT SPECS... SOLID CARBIDE, OR CARBIDE TIPPED!

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W. F. MEYERS CO., INC., BEDFORD, INDIANA

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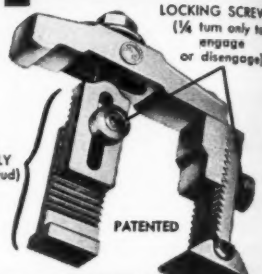

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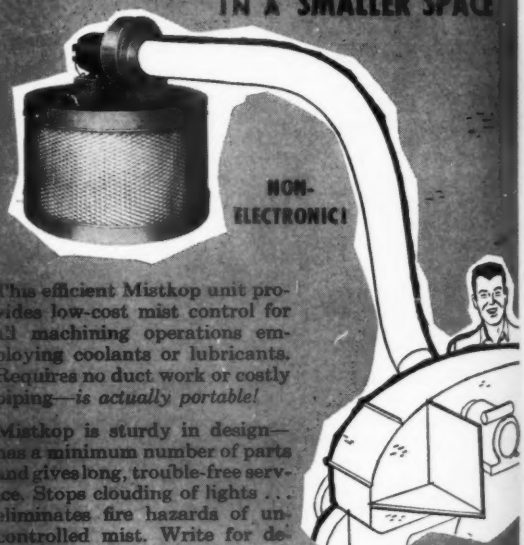
STOPS MIST

COLLECTS MIST-FOG EFFECTIVELY IN A SMALLER SPACE



This efficient Mistkop unit provides low-cost mist control for all machining operations employing coolants or lubricants. Requires no duct work or costly piping—*is actually portable!*

Mistkop is sturdy in design—has a minimum number of parts and gives long, trouble-free service. Stops clouding of lights . . . eliminates fire hazards of uncontrolled mist. Write for detailed description.

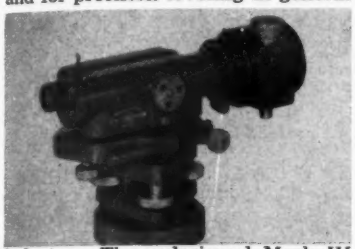
AGET Manufacturing Company
1394 Church Street • Adrian, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1284

Rigidity and Sturdiness are features of a series of high speed, heavy duty power drills. They can withstand considerable stress and

strain, and drill successfully where full length drills may fail. Size range is 3/64" to 1/2". Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich., or — **Circle No. A59.**

An Optical Tooling Level features eyepiece accuracy, convenience for machine tool assembly and erection, and for precision leveling in general

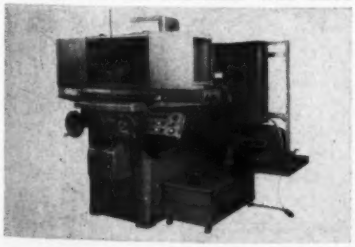


industry. The redesigned Mark IV microptic level B-131A reads to 0.001". Engis Equipment Co., 431 S. Dearborn St., Chicago 5, or — **Circle Inform-A-Gram No. A60.**

An Automatic Burnishing Machine can burnish two opposing faces of a cast iron transmission drum at the rate of 360 pcs/hr. Micro-finish is

improved from 100 RMS to 15 to 25 RMS with minimum change in dimension. F. Joseph Lamb Co., 5663 E. Nine Mile Rd., Detroit 34, or — **Circle Inform-A-Gram No. A61.**

Germanium Slicing can be done with a machine which permits greater accuracy, higher production, longer life, and low maintenance. Feeds as fine as 1/64 ipm can be obtained, and the machine will slice



slugs up to 2" dia and up to 6" in length. The metering of hydraulic fluid allows smooth travel needed for slicing brittle slugs. Reid Brothers Co., Inc., Beverly, Mass. **Circle Inform-A-Gram No. A62.**

Regulate Liquid Pressure as supplied by pressure pumps using an all-bronze, high capacity, automatic by-pass valve. The valve is set to open at the required pressure, and when the system demand is reduced, the excess liquid is by-passed back to the supply. Watts Regulator Co., Lawrence, Mass., or — **Circle Inform-A-Gram No. A63.**

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Trying to solve a knotty problem? Kaufman Drilling and Tapping Machines — assembled with our standard units or custom-made to your order — can help you cut production costs. From the engineer's drawing board to final installation, Kaufman's time-proven "know how" is saving money for many of the nation's leading manufacturers. Whether you need a machine for single or multiple operation or a machine for a new, unusual job — see Kaufman. Write or telephone for full information today!

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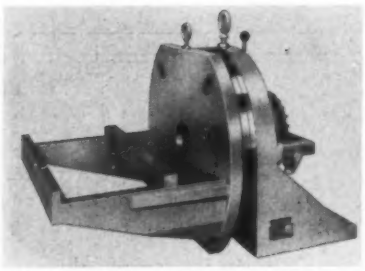
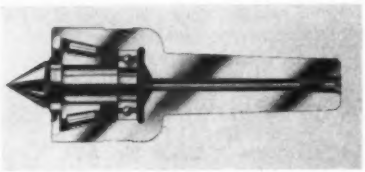


Ideal for Heavy Duty Radial Drills and Boring Mills are the 300 Model indexing trunnions. Smooth, easy rotation for the heavier loads, and the increase of spindle and base weight are features of the product. Face plates up to 30" dia may be used, giving capacity for holding larger work. Johnson & Bassett, Inc., 110 Foster St., Worcester, Mass., or— **Circle Inform-A-Gram No. A64.**

Precision-Built Live Centers feature a simple six-part design. The

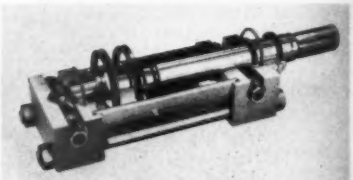


one-piece main body, serving as a cup for the roller bearing on which the spindle turns, permits use of a much greater than normal capacity bearing in a standard size body. Automatic wear adjustment takes place as the tapered roller bearing moves back when wear occurs. J. & S. Tool Co., Inc., 87 Dorsa Ave., Livingston, N. J., or — **Circle No. A65.**

An Air-Index Adaptor converts any long life Skyline series valve to momentary action. The double stroke adaptor is inserted between any Skyline series head and body combination. It simplifies the installation

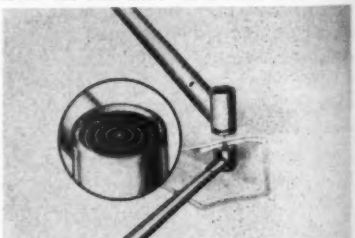
and the electrical circuit over the double solenoid types. Ross Operating Valve Co., 120 E. Golden Gate Ave., Detroit 3, or — **Circle No. A66.**

Air and Hydraulic Cylinders are designed for heavy-duty service. Nine bore sizes ranging from 1½" to 8" are available in a choice of 11 standard mountings to meet a wide range of installation needs. Included



in the three piston rod and styles are large external thread, small external thread with shoulder, and internal thread. Hydro-Line Mfg. Co., 5600 Pike Rd., Rockford, Ill., or — **Circle Inform-A-Gram No. A67.**

Locate a Drill Hole and distinctly mark the position with a blind hole locating tool. It will locate a drill hole on one side of a skin structure



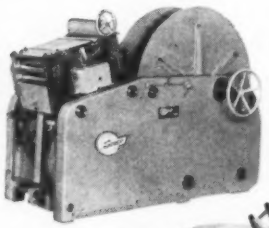
having a known location on the opposite side of such a structure. It will also locate broken drills. General Design Co., 631 30th St., San Diego 2, Calif., or — **Circle No. A68.**

Sesco INC. 8881 Central Detroit 4, Mich.

Original
Punch Press Gripper Feed
Pinch Gripping Assures Scuff-Free Feeding

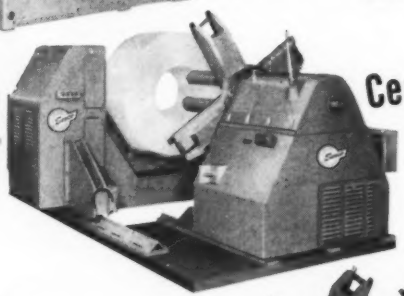
Sesco coil handling equipment is completely powered at a controlled rate to customer specifications

Cradle or Straightener available as separate units



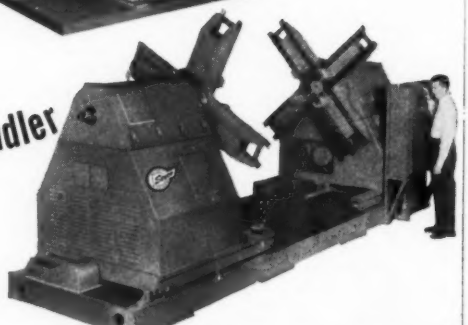
Combination Cradle and Straightener

Power-Lift Loader
It's a real production booster



Centering Reel
The first of its kind

TWIN-IN ACTION coil handler



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Plain and Motor Driven STRAIGHTENERS. Made in 18 models.

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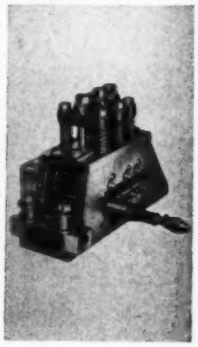

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- THOUSANDS HAVE PROVEN AND ACCEPTED THE DELUXE MODEL FOR YEARS.
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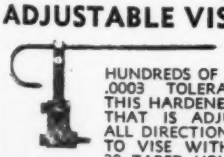

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HUNDREDS OF PIECES TO A .0003 TOLERANCE WITH THIS HARDENED VISE STOP THAT IS ADJUSTABLE IN ALL DIRECTIONS. ATTACH TO VISE WITH ONE ¼—20 TAPED HOLE.

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Get carbide wear at 1/3 the cost!

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Ritoloy gage surfaces are made of an extremely hard, wear resistant nickel alloy. They have a low coefficient of friction and are non-magnetic. Both Ritoloy plain plug and ring gages are available, and are made entirely and exclusively within our own plant.

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Good basic text on gage practices involving plain and thread plug and ring gages. Explains and prices Ritoloy gages too. Request the Rite-O Gage Primer and Price List today.

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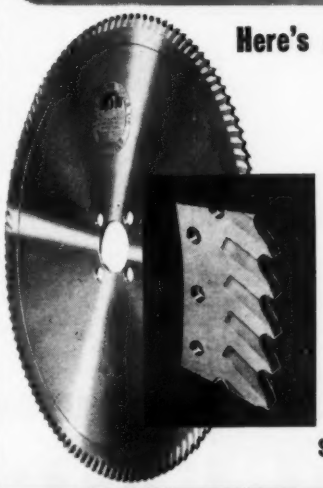

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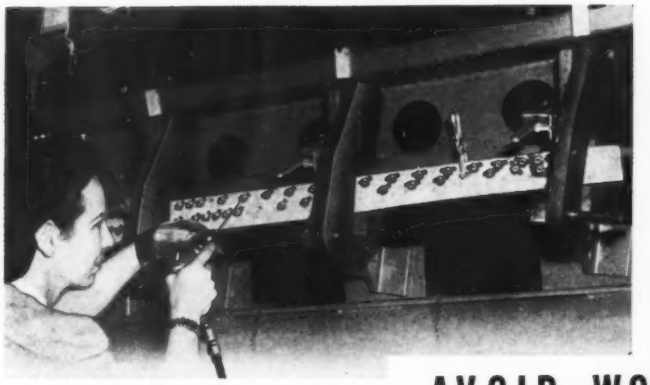
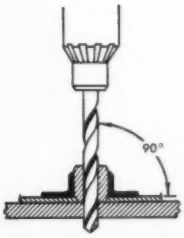
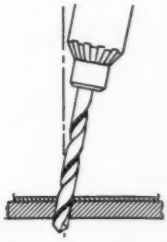


Free hand drilling of perpendicular holes using Anchor Bushing Drill Template at Ryan Aeronautical Co., San Diego.



ANCHOR BUSHING DRILL TEMPLATE — DRILL SUPPORTED AT LOW COST.



UNBUSHED DRILL TEMPLATE FOR LOW VOLUME PRODUCTION — NO DRILL SUPPORT.

AVOID WORK SPOILAGE—USE ANCHOR BUSHING DRILL TEMPLATES

Rejects threaten when unbushed drill templates are used to replace expensive drill jigs or fixtures on small quantity production runs.

Being low in cost and easy to make, Anchor Bushing drill templates prevent off-perpendicular drilling, inaccuracies of hole location and the use of wrong drill sizes.

Anchor Bushings are riveted or spot-welded to sheet metal, and riveted on or imbedded in laminated plastic materials. These lightweight drill templates can be made flat or in compound curves for a fraction of the cost, time and skill required for drill jigs or fixtures.

Learn how to make low cost, accurate drill tooling — write for the Anchor Bushing Catalog.

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Sales Representative for Kirk-Wing Company, Vega Baja, Puerto Rico.

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DEKA BORE

OFFSET BORING HEADS

UNPARALLED

- ACCURACY
- RIGIDITY
- SIMPLICITY
- DURABILITY

REPEAT TO .0001" IN 30 SECONDS WITHOUT BACKLASH! CAN BE ADAPTED TO FIT ANY MACHINE

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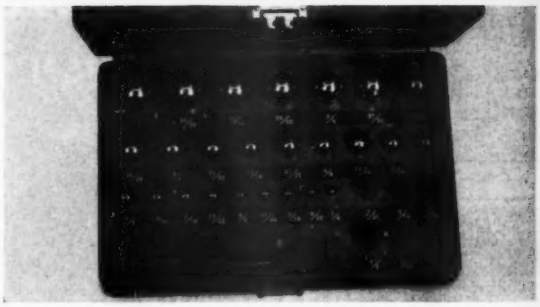

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Chrome steel, hardened and stabilized; accurate to .000010". **Set No. 32** (illustrated): 31 balls, 1/16" to 1" diam. by 1/32" steps. **Set No. 64**: 62 balls, 3/61" to 1" by 1/64" steps. Have 1001 uses in shop, tool room and gage room.

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TOOLING BALLS — MASTER BALLS — SPHERICAL FINISHING

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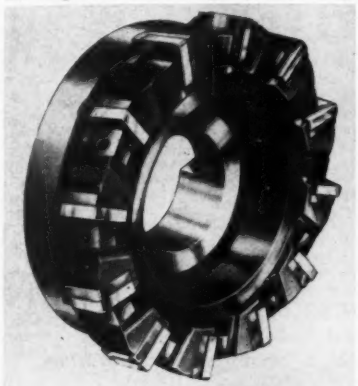
Simplified Manual Indexing for straight or spiral operations can be done with the Trig-R-Dex. This tool provides positive spacing, assures faster and more accurate indexing, and is of rugged construction. Both

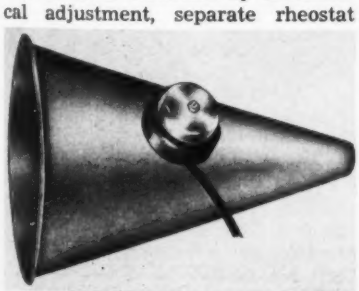
right and left hand operations having from one to 10 spaces can be accurately indexed. Detroit Reamer & Tool Co., 780 W. Maple Rd., P. O. Box 174-R, Birmingham, Mich., or — **Circle Inform-A-Gram No. A69.**

Inserted Blade Shell End Mills and Face Mills utilize ½" and ¾" square standard throw-away carbide inserts. This line of milling cutters has double negative rake angles, and they



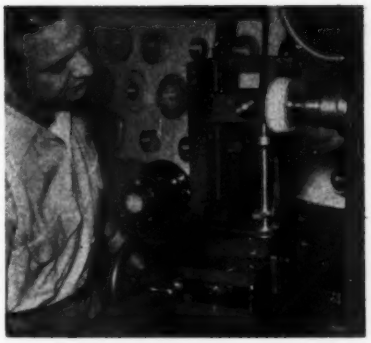
have generous chip room along with close blade spacing to provide high feed rates. The Viking Tool Co., 1000 Nichols Rd., P. O. Box 471, Shelton, Conn., or — **Circle Inform-A-Gram No. A70.**

Control Vibration of diminutive dispensing hoppers and parts-feed tracks of processing, assembling, and packaging machines with an electromagnetic vibrator. Model V-2 controls vibration by mechanical adjustment, separate rheostat

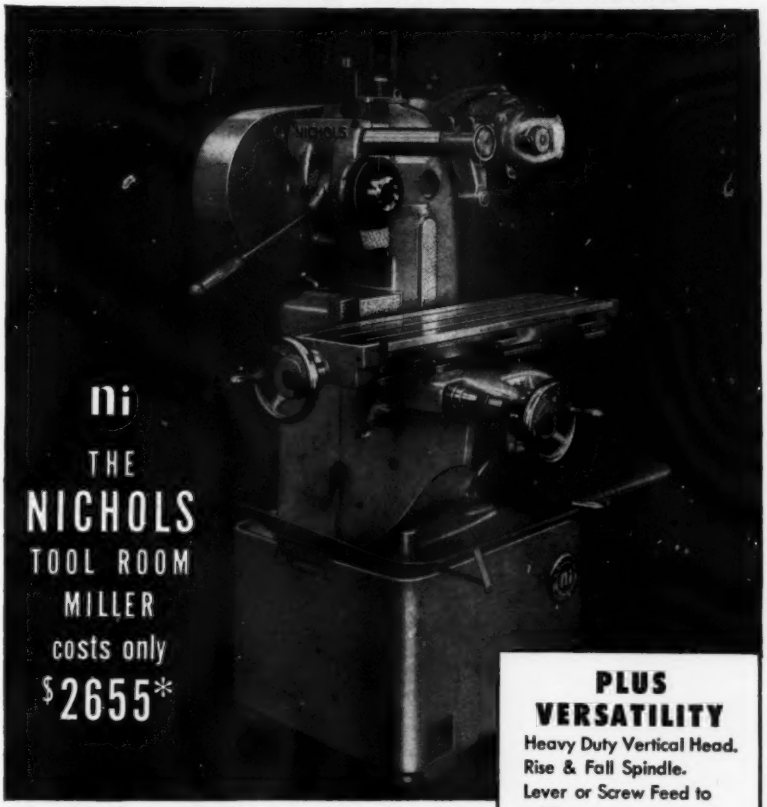


control box, or separate rheostat and rectifier control box. Syntron Company, 341 Lexington Ave., Homer City, Pa., or — **Circle No. A71.**

A Motorized Center Unit makes possible concentricity and squareness accuracies of 0.00005" when used with a surface grinder. Jobs not normally handled on a surface grinder can be set up easily and ground accurately when the motorized center unit is used. AA Gage Co., 350 Fair St., Detroit 20, or — **Circle A72.**



a COMPANION in ACCURACY for YOUR JIG BORER



*FOB Waltham, Mass., complete with 1 HP motor drive and standard equipment.

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PLUS VERSATILITY

Heavy Duty Vertical Head.
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Lever or Screw Feed to table.
Full line of accessories.
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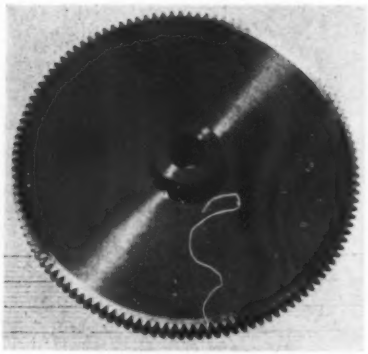
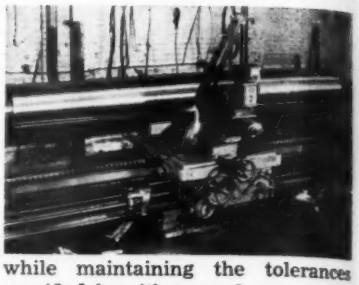


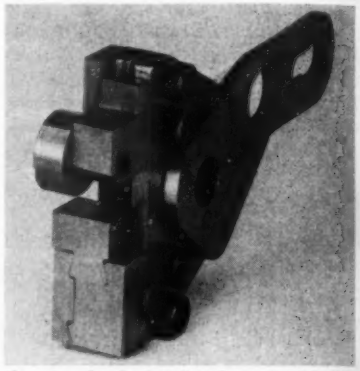
Fine Pitch Spur Gears are announced by PIC Design Corp., Sub. of Benrus Watch Co., 477 Atlantic Ave., E. Rockaway, L. I., N. Y. They are available in 48, 64, 72, 96, 120, and 200 pitch and in stainless steel, aluminum, nylon, and phenolic. **Circle Inform-A-Gram No. A73.**

Reduce Grinding Time of either metallic or rubber rolls with abrasive belts and roll grinding attachments. They are used for grinding and polishing steel, cast iron, brass, aluminum, and stainless steel rolls,



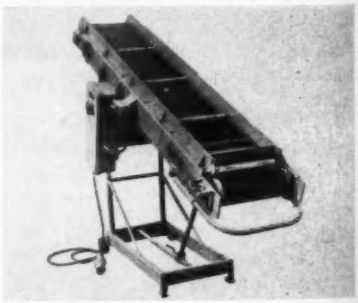
while maintaining the tolerances specified for either regular or special straight or crowned rolls. The Carborundum Co., Box 477, Dept. R.G., Niagara Falls, N. Y., or — **Circle Inform-A-Gram No. A74.**

Better Finishes, closer consistent production tolerances, can be obtained using the Little Shaver. This tool can shave and form parts that cannot be accomplished with ordinary circular form tools. It will fit



the standard circular form tool holder, automatic screw machines, hand screw machines, and turret lathes. Jersey Mfg. Co., 456 Livingston St., Elizabeth, N. J. **Circle Inform-A-Gram No. A75.**

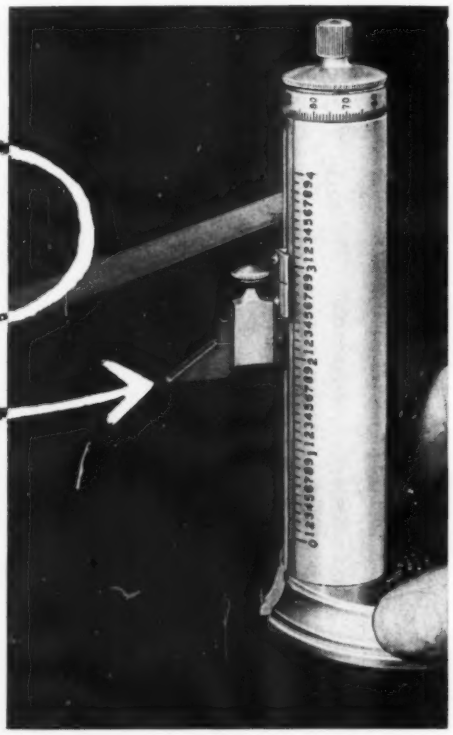
A Portable and Adjustable Heavy Duty Conveyor has been announced by May-Fran Engineering, Inc., 1726 Clarkstone Rd., Cleveland 12. It is recommended for conveying heavy

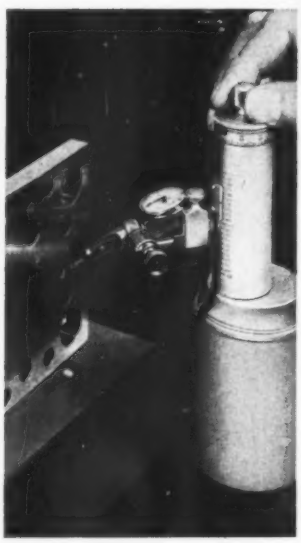


metal stampings between presses, as well as for the mechanized handling of all types of heavy parts and assemblies. Working height is adjustable, and conveyor pitch can be adjusted for any angle up to 45°. **Circle Inform-A-Gram No. A76.**

FOR **FAST** LAYOUT

GREIST
MICRO-HEIGHT®
GAGE





New model has 5" direct capacity —gives you 11" range with Riser

Micro-Height measures and scribes like a vernier gage. Reads **faster than your micrometer!** Measures height direct from **zero at base.** Hundredths on barrel . . . thousandths on large head that eliminates errors and **cuts reading time.**

FAST **INSPECTION!**

Add the Greist Indicator Holder for speedy inspection—with your present dial indicator.

MICRO-HEIGHT "4" has 5" capacity (11" with Riser). Price, without scriber, only $57.

MICRO-HEIGHT "2" has 3" capacity (9" with Riser). Price, without scriber, only $36.50.

Accuracy ±.0003". Rustproof, satin-chrome finish.

Call your **GREIST** *distributor or write*

THE **GREIST** MANUFACTURING COMPANY, 483 BLAKE ST., NEW HAVEN 15, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 134

Walton-American

THE "MULTI-POSITION" TOOL HOLDER

with 8 positions in ONE

This versatile Tool Holder **will reduce your tool expense.** Only ONE will replace many standard types. Its swivel head, giving perfect grip, will position around an entire circle.

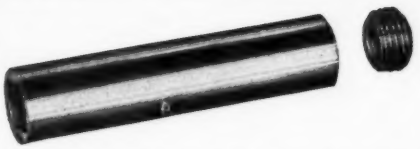
The Walton-American **will reduce your labor cost.** All changes can be made at the machine, eliminating lost time for trips to the tool room. The capacities of four sizes range from 1/8" to 1/2".

Economy is doubly assured for jaws will not break high speed tool bits . . . and very short bits can be used. Take advantage of Walton's 30-day-free-trial to investigate these savings in your shop. Write for Data Folder No. 38.

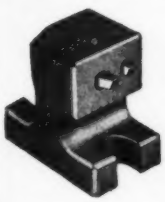
SINCE 1908 — THE WALTON COMPANY — HARTFORD 10 CONNECTICUT

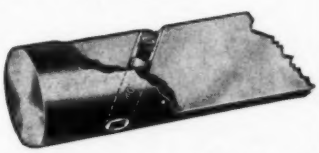
CIRCLE INFORM-A-GRAM KEY NO. 1351

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!



One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.





The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:
3/16, 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4, 1"

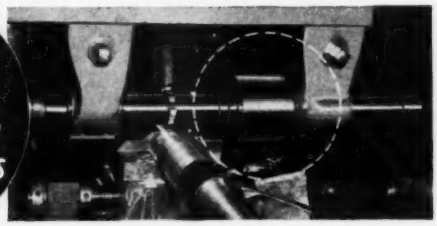
Write for Literature

STURDY BROACHING SERVICE, INC.
23516 TELEGRAPH RD., DETROIT 41, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1352

ELIMINATE MILLING MACHINE MAINTENANCE

OF ARBOR OUTER SUPPORT BUSHINGS



OFTEN UPS SPEEDS AND FEEDS 200%

Sound too good to be true? Then see how General Electric, Jeffrey Mfg., hundreds of others **absolutely end arbor bushing maintenance problems and decrease production costs on horizontal milling machines by replacing the bronze outer support bushing with a Jergens "Live" Sealed Roller Bearing Unit as illustrated above. Jergens Units with adjustable roller bearings hold precision—permit increases in milling speeds and feeds to take full advantage of carbide cutters. The rigidity of these units increase cutter life and eliminate chatter, frozen bushings, and twisted arbors.**

SEE HOW HUNDREDS SAVE THOUSANDS!

WRITE FOR **FREE** CASE HISTORIES OF ACTUAL company performance reports of jobs and dollars saved!

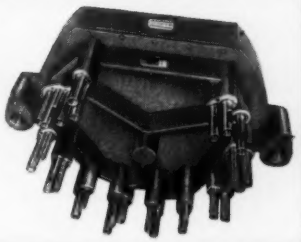
DONLEY PRODUCTS, INC.
Dept. TP-3, 11106 Avon Ave. • Cleveland 5, O.

CIRCLE INFORM-A-GRAM KEY NO. 1353

This **THRIFTMASTER**

Fixed Center **DRILLHEAD**

does 27 jobs in 1 fast operation!



Get maximum production — use Thriftmaster designed and built Fixed Center Drillheads . . .

- Full ball bearing construction
- Fully hardened chrome-moly steel gears, spindles and drives
- All sizes, any number of spindles
- All types, including angular, rotating and lead screw
- For drilling, tapping, reaming, boring and milling
- Guaranteed performance backed by over 25 years of engineering and production experience

Also Full Ball Bearing Universal Joint, Single and Double Eccentric Adjustable Drillheads and Dorman Tappers.

Write, wire or phone for complete information today.

THRIFTMASTER *Products Corporation*
A SUBSIDIARY OF THOMSON INDUSTRIES, INC.

1012 N. Plum Street
Lancaster, Penna.

CIRCLE INFORM-A-GRAM KEY NO. 1354

SPECIFY TOP QUALITY

DE-STA-CO

ARBOR SPACERS SHIMS and SPACING COLLARS • Arbor Spacers and Shims in 20 sizes and thicknesses from .001" to .125". Arbor Spacers furnished with standard keyway; Shims, with no keyway. Also Spacing Collars in numerous popular diameters, and in thicknesses from ⅛" to 3". Hardened and ground; edges chamfered. Furnished with standard keyway.

FEELER STOCK • Made from tempered stock, rolled to close tolerances, ½" x 25' coils packaged in transparent plastic boxes, except above .020". Strips ½" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)

SHIM STOCK • Steel or brass. Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses, .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in two assortment packages —12 thicknesses, .001" to .015", and 15 thicknesses, .001" to .032".

DE-STA-CO

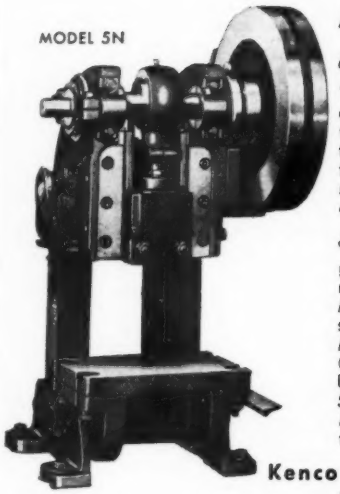
WRITE FOR Illustrated Brochure and Price List!

DETROIT STAMPING CO.
344 Midland Ave. Detroit 3, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 1361

KENCO 5-TON
PRECISION-BUILT
PUNCH PRESSES

MODEL 5N



High speed punching... at low cost

These sturdy presses punch accurately and reliably at speeds up to 285 strokes per minute. Kenco-built for simple maintenance and long life, they save you time and manpower. Rugged, multiple-rib frame has tremendous strength... extra-long ram guides permit full use of the guiding area down to the bottom of the stroke for extra precision.

Six 5-ton models

provide low-cost solutions to many punching problems: Model 5 Standard (variable speed), Model 5-N Standard, Model 5-NR deep-throat (12¾" throat), Model 5-NA Universal 4-in-1 press, Model 5-A Universal Vari-speed, Model 5-R Vari-speed deep-throat.

Kenco presses—14 models—2 to 15 tons

Write for literature

KENCO MANUFACTURING CO.
5211 Telegraph Road, Los Angeles 22, California

CIRCLE INFORM-A-GRAM KEY NO. 1362

KUTMORE ADJUSTABLE HOLLOW MILLS

A MIGHTY MIDGET!

This Midget Floating Holder Hollow Mill, flange type, has micrometric adjustment, and is designed to permit easy compensation for any spindle misalignment. Small, sturdy, extremely accurate!

WRITE FOR CATALOG 20 TP

It shows complete line of adjustable hollow mills. Our Engineering Dept. is at your disposal for special requirements.

CARL WIRTH & SON, INC.
1625 CLINTON AVE. NO. ROCHESTER 5 N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1363

DYKEM STEEL BLUE

Stops Losses making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

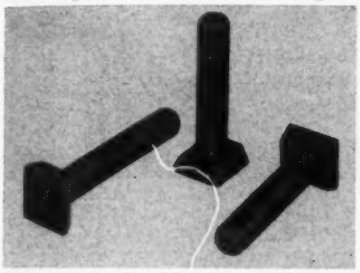
THE DYKEM COMPANY
2303L North 11th St. • St. Louis 6, Mo.

CIRCLE INFORM-A-GRAM KEY NO. 1364

Single-Lip Countersinks provide smooth, chatterless operation in even the toughest of the alloy steels. They come in seven body diameters in increments of ⅛" from ¼" to

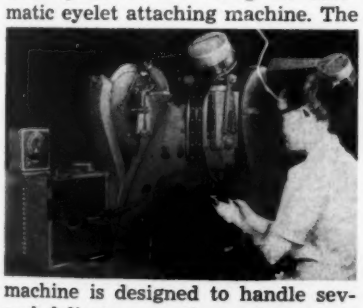
1". The tools provide fast, clean cutting, and cutting life is approximately 10 times longer than others. Schrillo Aero Tool Engineering Co., Los Angeles 46, or — **Circle No. A77.**

Hold Gages and Stock Stops on press brakes and shears with a line of dovetail bolts. They have 100% machined heads with two opposite sides tapered dovetail at 30° angles.



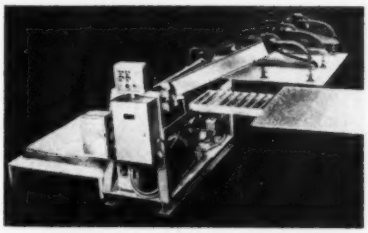
They are made of heat-treated metal for tensile strength of 150,000 psi. Jergens Tool Specialty Co., 712 E. 163 St., Cleveland 10, or — **No. A78.**

Speed Production of Printed Circuits, reduce costs, and almost eliminate eyelet failure using an automatic eyelet attaching machine. The

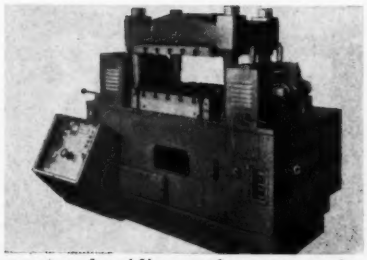


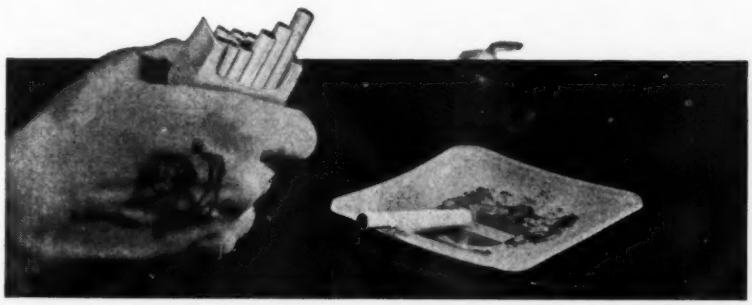
machine is designed to handle several delicate operations which were formerly performed by hand. Edward Segal, Inc., 72 Spring St., New York 12, or — **Circle No. A79.**

A Sheet Feeder is designed to handle a wide variety of materials such as metal in flat or formed, or rectangular or irregular shapes. The feeder is used to deliver sheets from piles of processing equipment, such as slitters, punch presses, forming machines, etc. The deFlorez Co., Inc., Div'n of The Dexter Co., 116 E. 30th St., New York, N. Y., or — **Circle Inform-A-Gram No. A80.**



A Two Point, Under Drive Stamping Press is available in 75, 100, 150, and 200-ton capacities. Greater alignment and guiding surface area and a four post guide to the upper platen, insures precision alignment of punch and die. Alpha Press & Machine, Inc., 9281 Freeland Ave., Detroit 28, or—**Circle Inform-A-Gram No. A81.**





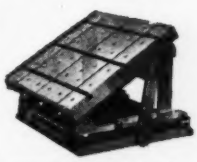
Half the Cost of "a Pack a Day"

CUTS TOOLROOM COSTS THE *Robbins* WAY

Robbins angular tooling equipment often pays for itself the first few times you use it . . . but let's be conservative. Let's talk about writing off the cost over ten years. (About half the useful life of a "Magna-Sine!") Written off in this manner, the Model A-5 Magna-Sine illustrated represents an investment of around twelve cents a day!

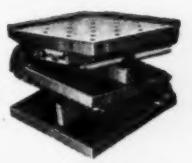
This equipment saves dollars of valuable toolroom time on every job. Set-ups that require *hours* by other methods take just *minutes* the Robbins way. Set up to machine, grind or inspect any angle in just four simple steps: (1) Look up required angle in Table of Constants furnished with unit, (2) Select gage blocks indicated, (3) Place blocks between base and sine bar swivel block, (4) Secure the work . . . and you're ready to go!

This simple, fast, sure method sets up any angle, single or compound, right or left hand, without V-blocks, angle plates or complicated "build-ups." Complete range of models and sizes puts Robbins precision equipment within the reach of every shop. Write now for literature.



HEAVY DUTY SINE PLATE FOR MACHINING

"MAGNA-SINE" WITH MAGNETIC TABLE



FOR INSPECTION AND LIGHT MACHINING

OMER E. *Robbins* COMPANY

11961 DIXIE AVE. DEPT. C DETROIT 39, MICH.

See These Robbins Products At Booth No. 1661 A.S.T.E. Exposition

CIRCLE INFORM-A-GRAM KEY NO. 137

FASTER FEEDS WITH ... SUPERBORE

THE COUNTERBORES WITH

Standard

1/64" Oversize

1/32" Oversize

Available from stock for each screw size

30° Right Hand Spiral, 4 Flute

Now you can speed up production 100% with our *New* **30° mark right hand spiral,** four-flute counterbores.

You will find that faster feeds are possible with this freer-cutting tool.

Hardened counterbore blanks in stock can be ground to any special pilot and flute diameters in one week.

Few territories open for manufacturer's representatives.

Free

Complete Reamer catalogue with world's Greatest Reamer selection by the Thousands' and thousandths.

Write for it today!

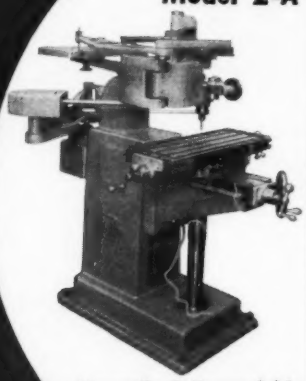
TWENTIETH CENTURY MANUFACTURING CO.

ROUTE 176 and BRADLEY ROAD
BOX 429TP, LIBERTYVILLE, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1381

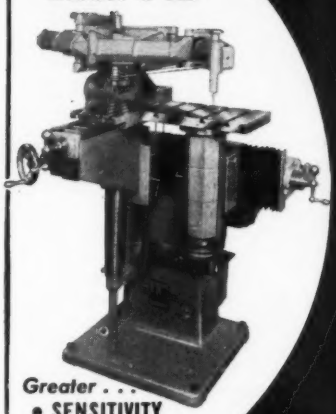
J & B PANTOGRAPH MILLING MACHINES give you maximum accuracy and efficiency!

2 Dimensional Model 2-A



Versatile & Dependable
- ENGRAVES
- PROFILES
- DIE CUTS
- MILLS

3 Dimensional Model 3-AB



Greater . . .
- SENSITIVITY
- CAPACITY
- ACCURACY
- RANGE

J & B pantograph milling machines are designed to give maximum efficiency and accuracy in modern industrial applications.

Model 2-A performs tracer-controlled engraving operations plus die cutting and profile work.

The 3 Dimensional J & B pantograph miller Model 3-AB is a sturdy production machine which reproduces copy on flat or curved surfaces, in reduced or magnified size.

Send for J&B EST. 1870 *Latest Brochures*

JOHNSON & BASSETT, INC.

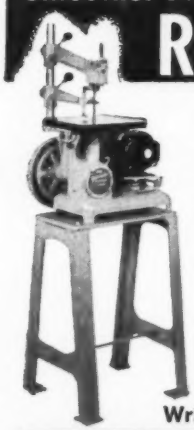
PRODUCTION TOOL DIVISION

WORCESTER, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 1382

Smoother Production! Higher Output! Lower Costs!

RICE-MILWAUKEE



DIE FILERS . . . for straight-line sharp corner filing, sawing and lapping.

This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

PROFILE GRINDERS

. . . for high speed Precision Grinding of Curved and Irregular Contours.

Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

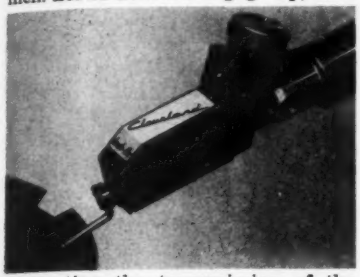
Write for Illustrated Bulletins and Prices

RICE PUMP & MACHINE COMPANY

228 PARK AVENUE BELGIUM, WISCONSIN

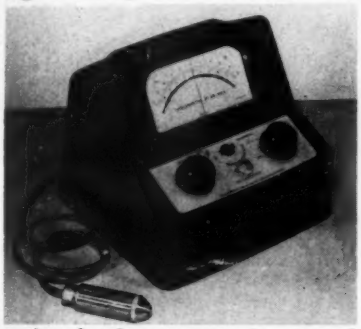
CIRCLE INFORM-A-GRAM KEY NO. 1383

A Protector Gage Tip has been developed to provide protection against blows from all directions and will remain accurate to millionths of an inch. Blows deflect the gage tip, thus



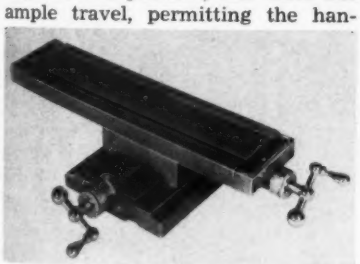
preventing the transmission of the blow and damage to the gaging element. It can also be used for hole or groove bottoms. The Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, or — **Circle No. A82.**

Quick, Accurate Process Gaging on the machine or at the site of operation can be done with the Electronic Comparator. Because bearings or linkages are not used in the



gaging head, accuracy is assured once it is set and no resetting is required, regardless of amount of usage. Threadwell Tap & Die Co., Greenfield, Mass., or — **Circle Inform-A-Gram No. A83.**

Produce Holes in Drill-Jig Plates and similar work where extreme accuracy is desired, with a compound table. Capable of being locked at any desired position, the table has ample travel, permitting the han-



dling of large work. Extension handles can be fitted to allow use of the attachment on a machine larger than the average bench drill. Air Transport Equipment, Inc., Amityville, N. Y., or — **Circle No. A84.**

Turret Jaw Vises clamp workpieces of any shape with positive grip on at least 4 points without use of special inserts or attachments. They are available in machine and

bench type models with jaw openings from 2" to 8", and can be used for milling, grinding, planing, etc. Hudson Automatic Machine & Tool Co., 137-139 38th St., Union City, N. J., or — **Circle No. A85.**

THE INFORM-A-GRAM CARD FOLLOWS PAGE 148 IN THIS ISSUE.

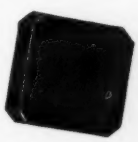
New McCROSKY Series "900" Milling Cutters

for Milling with "THROW-AWAY" Carbide Inserts

Standard 12" No. 967-T Face Mill Fitted with Triangular Carbide Inserts

These new cutters eliminate the time and cost of regrinding blades. They reduce the investment in cutters needed to handle a wide variety of work;—cut milling costs;—and provide users with all the other time and cost saving advantages of milling with "Throw-Away" carbide inserts.

Our widely used, patented Super-Jack* Wedges hold the inserts solidly against ground surfaces in the body, preventing any movement even under heavy feeds and speeds, assuring utmost efficiency and dependability. Inserts can be unlocked easily, and indexed quickly and accurately on the machine, providing almost uninterrupted production. Interchangeable with conventional cutters. 16 standard sizes including face and end mills. 4" to 12" diameter. Also "Specials" to meet any requirement. Get full details. Write for our new Bulletin No. 572—Today!



Square Carbide Insert

Triangular Carbide Insert

*U. S. Patents 2,508,437; 2,547,789; 2,632, 536

The complete McCrosky line includes:

Jack-Lock® Milling Cutters — *Wizard*® Quick-Change Chucks
Super® Adjustable Reamers — *Block Type* Boring Bars
Turret Tool Posts — *Specially Engineered* Multiple Operation Tools

Fully descriptive catalogs sent promptly on request. Write for yours today!

COST CUTTING TOOLS

McCROSKY TOOL CORPORATION
MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities

CIRCLE INFORM-A-GRAM KEY NO. 139

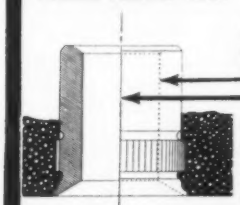
NOW!
FLAR-A-LOCK®
PRESENTS A
NEW
LOW COST DRILL BUSHING
FOR PLASTIC TOOLING

● CUT TOOLING COSTS WITH AN ECONOMICAL DRILL BUSHING THAT CAN BE PRESSED AND LOCKED IN THE TOOL AFTER LAMINATION, OR INSTALLED BY CONVENTIONAL TOOLING METHODS.

PERMITS CLOSE HOLE PATTERN

● NO RIVETS REQUIRED—SIMPLY INSTALLED WITH EITHER A HAMMER AND HAND FLARING TOOL OR WITH AN ARBOR PRESS AND STATIONARY FLARING TOOL.

QUICKLY INSTALLED!


ALL WEARING SURFACES ARE ACCURATELY CASE HARDENED.
BUSHING CENTERLINE IS HELD CONCENTRIC WITH THE PILOT HOLE IN TEMPLATE BY THE UNIFORM RADIAL DISPLACEMENT OF THE FLARE

EASILY REMOVED!

● ALSO AVAILABLE FOR 1/16" AND 1/8" SHEET STEEL OR ALUMINUM AND 1/4" MASONITE BOARD.

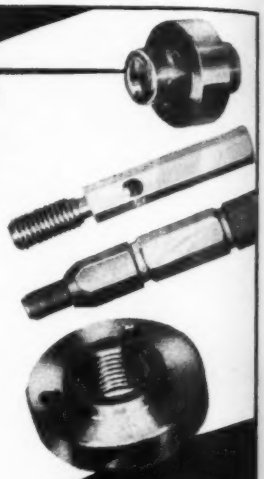
NO SPECIAL SKILL!

WRITE TODAY FOR CATALOG #1028

TECHNO-PRODUCTS CORP.
P.O. BOX 308, SWARTHMORE, PENNA.

CIRCLE INFORM-A-GRAM KEY NO. 1401

Thredco GAGES
for
Accuracy
Quality
Reliability
Economy



Write, Wire or Phone for THREDCO GAGE CATALOG No. 7

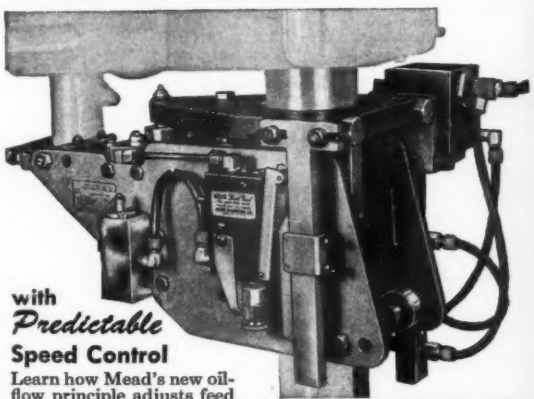
Satisfies Your Every Need

Thredco COMPANY
3842 W. ELEVEN MILE RD. BERKLEY MICH.
LIncoln 5-6363

CIRCLE INFORM-A-GRAM KEY NO. 1402

New Fluid Feed AIR-HYDRAULIC DRILL PRESS FEED!

Combines Steady Even Hydraulic Control with Economical Dependable Air Power!



with Predictable Speed Control

Learn how Mead's new oil-flow principle adjusts feed rate accurately 2 to 60 inches per minute—other superior features. Write factory or nearest Mead Man for folder plus Catalog of Mead units suitable for automation with it!

MEAD SPECIALTIES COMPANY
4114 N. Knox Ave., Dept. HA-3B
CHICAGO 41, ILLINOIS

PATHFINDER IN AIR POWER AUTOMATION

CIRCLE INFORM-A-GRAM KEY NO. 1403

PUBLICATION PREVIEWS

CATALOGS • BULLETINS • SPECIFICATIONS

Circle Inform-A-Gram key number on postage-free Reader Service Card for your request.

Drill Jig Bushings are covered in a bulletin issued by Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32. Discussed are a large range of lengths and OD sizes in press-fit types; a new 5/32" OD group of press-fit bushings

with holes as small as 0.0152" dia; and a new ½" length added to the ⅞" and 1" OD groups of head and headless press-fit bushings. Copies of Catalog 35875 can be obtained by writing to the company, or — **Circle Inform-A-Gram No. B1.**

Material Inspection can be done using the borescopes discussed in a bulletin from National Electric Instrument Co., Inc., Elmhurst, N. Y. These instruments can detect imperfect welds, harmful drawmarks, or any flaws not otherwise capable of detection visually within tubing of all diameters and whether cast, welded, or drawn. Specifications are given of the borescopes in the bulletin available from the company, or— **Circle Inform-A-Gram No. B2.**

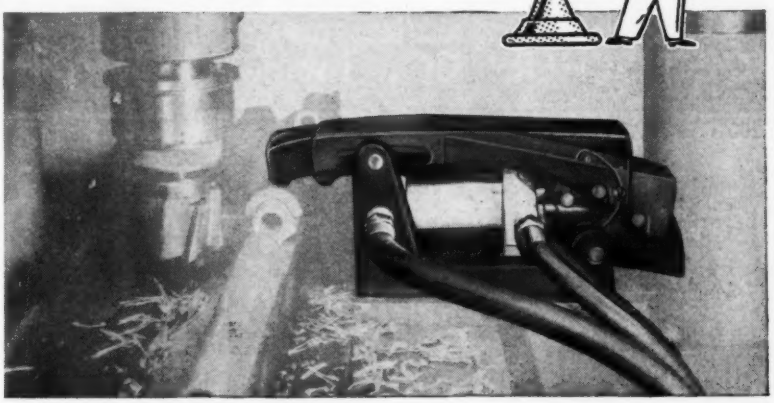
Metal Cutting Tools are illustrated and discussed in a 60-page catalog from Ed. Castor Associates, 93 Oak St., Wyandotte, Mich. Specifications are given for end mills, reamers, center drills, tapered end mills, taps, drills, and gages. For more information, write for a copy of Catalog 1257, or — **Circle No. B3.**

Increase Tool Life through accurate measurements of tool finish with the Profilometer, described in a bulletin. Features and advantages are also discussed. Write to Micrometrical Mfg. Co., 345 S. Main St., Ann Arbor, Mich., for copies of Bulletin LT-6, "Profilometer Shows How . . . ." **Circle No. B4.**

Prevent Eye Accidents, cut eye accident costs, and provide worker comfort with the safety glasses outlined in an illustrated bulletin. Detailed construction and engineering features of the glasses are illustrated. Contact Safety Products Div'n, American Optical Co., Southbridge, Mass., for copies of Brochure S-6761. **Circle Inform-A-Gram No. B5.**

Cutting Tools, including ground rotary cutters, countersinks, and solid carbide end mills, are discussed in a bulletin. Cutting diameters and length of tools are among the specifications given for each tool. Get Bulletin 701 from M. A. Ford Mfg. Co., 1545 Rockingham Rd., Davenport, Iowa, or — **Circle Inform-A-Gram No. B6.**

STILL ANOTHER LODDING FIRST!



Lodding, Inc. announces a completely automatic clamp (patent pending). This new Lodding production meets the need of the metalworking industry for a compact, automatic and heavy-duty clamp. Air operated and cam locked to hold clamp locked in any event of air failure. Note the compactness (the air cylinder is under the clamp). Delivers ten times line pressure. All wearing parts heat treated. Overall dimensions are 3" wide, 3⅝" high and 8¼" long.

LODDING, INC.
WORCESTER 1, MASS.

Goodwin-Snader Co.
6814 S. Western Ave.
Los Angeles 47, Calif.

FACTORY WAREHOUSES

Bagby Engineering Co.
1047 Forest Ave.
Evanston, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 141

INSPECTION BY PROJECTION

with the *NEW* SCHERR MICRO PROJECTOR with the VERTICAL DESIGN

NEW IMPROVED *Self-Contained* MODEL featuring

- Rigid Floor Base — eliminating extra charge for table
- Tilting Stage for Helix, Angles and Bevels
- 4" Dia. Stage Opening
- 14" Diameter Screen
- Column Slide adjustable for wear by means of gibs. Will hold square indefinitely.
- Custom made Precision Coated Lenses and double condensers for different objectives 10 to 100X magnification.
- Surface Illuminator can be added anytime.
- An entirely new practical designed tool for Inspection Department and Production Shop.

WRITE FOR ILLUSTRATED FOLDER CODE GIUJY

BASIC PRICE . . . $395.00

SCHERR PRECISION COMPARATOR CHARTS

OVERLAY and REPLACEMENT STANDARD CHARTS are carried in stock.

SPECIAL CHARTS made up to your specifications.

GEO. SCHERR CO., Inc.

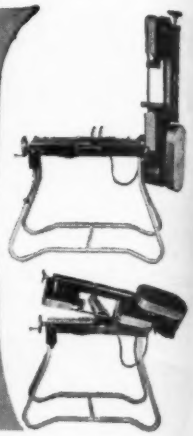
COMPLETE LINE OF PRECISION INSTRUMENTS

200 T LAFAYETTE STREET • NEW YORK 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1421

SAWS for the PRICE of

. . . use the WELLS 49A for Horizontal Cut-off and Vertical Band Sawing



The Wells 49A is a dual-purpose machine designed for shop or "job-site" work. As a horizontal cut-off saw, the 49A has a capacity of 3½" x 6". Swing the head to vertical position . . . it's an upright band saw. No tools required! Use it for cutting angles, slots, notches, bevels and light contour work.

The 49A can save time and money for you. Let your local Wells Distributor show you how . . . or write direct for complete information.

Wells

The Pioneers of Horizontal

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION

1940 CEDAR ST., THREE RIVERS, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1423

FREE... 64 PAGE CATALOG

WORLD'S LARGEST LINE OF WORK HOLDING EQUIPMENT—CHUCK JAW BLANKS, CAST ALUMINUM AND MALLEABLE KNOBS, WHEELS, HANDLES—PLUS HUNDREDS OF OTHER JIG AND FIXTURE COMPONENTS

COMPLETE DETAILED SPECIFICATIONS

ENGINEERING DRAWINGS • COST SAVING DATA

write for your copy—TODAY!

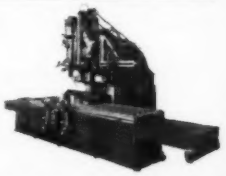
JERGENS TOOL SPECIALTY CO.

Dept. TP-3 712 E. 163rd St., Cleveland 10, Ohio

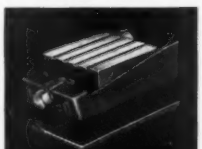
CIRCLE INFORM-A-GRAM KEY NO. 1422

VIBRATION ?

. . . *but not here!*



Prevent harmful machine vibration with EMPCO Leveling Jacks and VI-SORB Mounting Pads



JACKS IN SIX STYLES, 25 MODELS. PADS TO FIT.

To avoid excessive machine vibration, *set* them level, *keep* them level, with EMPCO Leveling Jacks! Easy to install, EMPCO Jacks provide a solid, easily adjustable foundation for machine tools, large surface plates, automation lines, tool room and production equipment of all types. Used with VI-SORB Mounting Pads, they further reduce objectionable vibration, retard creepage and often eliminate the need for anchor bolts.

INQUIRE TODAY ASK FOR BULLETIN NO. 100

EMPCO LEVELING JACKS

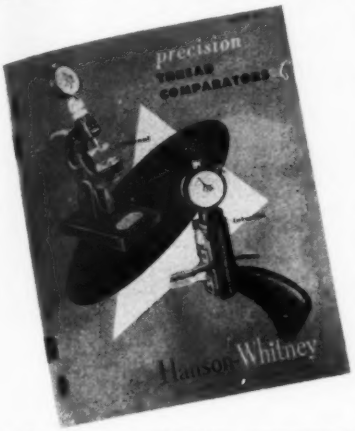
THE ENTERPRISE MACHINE PARTS CORPORATION

2735 JEROME AVENUE • DETROIT 12, MICHIGAN

Manufacturers of Automatic Production Machines, Fixtures, Machine Parts

CIRCLE INFORM-A-GRAM KEY NO. 1424

Visual Gaging can be done easily with the precision thread comparators, both external and internal, featured in a bulletin. They are fully described and illustrated, as are attachments for checking squareness and concentricity of threads. Write to Hanson-Whitney Co., Hartford, Conn., for copies of Catalog TC-1, or—**Circle Inform-A-Gram No. B7.**



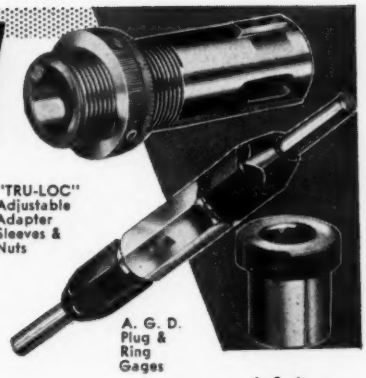
A Solution to The Blind Hole Tapping Problem is discussed in a bulletin. Tap to the very bottom of a hole with no allowance for chip room with Tap-Cartridges. This is one of the advantages of these products outlined in a bulletin. Copies may be obtained from The Tap Cartridge Co., 2020 Thomas St., Hollywood, Fla., or — **Circle No. B8.**

Airless Blast Cleaning Machines, as well as wet blast, air blast, and dust control equipment, are covered in a catalog. Also included are cast steel shot and grit abrasives, sandcutters, and core rod straighteners. Write Wheelabrator Corp., 1183 S. Byrkit St., Mishawaka, Ind., for copies of Catalog 951-D, or — **B9.**

Drills, Reamers, and End-Mills are highlighted in a comprehensive 96-page catalog which contains colored photographs of various applications of these products. The finger-indexed catalog gives standard sizes, dimensions, and specifications in chart form. For your copy of Catalog 58, write to Greenfield Tap and Die Corp., Greenfield, Mass. **Circle B10.**

Cut Set-Up Time using a quick change device, the Arbor-Loc, on knee and column milling machines having a 50 series spindle nose. Features, simple operational steps, and specifications are contained in a bulletin. For more information, write to The Cincinnati Milling Machine Co., Cincinnati 9, for copies of Catalog M-2016, or — **Circle No. B11.**

ECONOMY



"A Name To Remember"

– whenever your duplication requirements call for the standard tool items illustrated here. Stocks at ECONOMY are always complete – assuring you of quality and service.

Descriptive Bulletins, Prices, and Dimensional Data Sheet No. 7-A upon request. Ask for prices on salvaging worn-out plug and ring gages.

ECONOMY TOOL & MACHINE CO.

1828 South 68th Street Milwaukee 14, Wisconsin

CIRCLE INFORM-A-GRAM KEY NO. 1431

most **VERSATILE PIN GAGES** *made!*

Horberg exclusive taper feature lets you check undersize, oversize and odd-size holes, slots, etc., quickly and accurately with standard letter, number or drill-size gages.

A precision concentric taper on the lower half of each gage runs to 0.0012" smaller than gage size. You get a continuously accurate range of measurement with each gage, for quicker, handier, precision gaging in set-up, machining, tooling and inspection operations.

SPECIFICATIONS

Diameter accurate to +0.0001" –0.0000"
Standard 1.5" length
Concentric taper on lower half to .0012" smaller size
Oil hardened tool steel

PRICES AND ORDER FORM (F.O.B. Bridgeport, Conn.)

_____Letter sets—32 gages A-Z in pairs $65.00
_____Fraction sets—60 gages 3/64" to 1/2" in pairs $75.00
_____Number sets—120 gages 1-60 in pairs $130.00
_____Single gages_____size ea. $1.50

Sets furnished in indexed plastic case. Extra case $15.00
Prices subject to change without notice.

Please rush items checked to:

Name_____

Company_____

Address_____

Horberg GAGE COMPANY 29 Staples St., Bridgeport, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1432

How To Eliminate Spoilage In Your Tool Hardening

Scale, decarburization, carburization — all these three costly types of spoilage are due to your furnace atmosphere. But they do not occur in Sentry Model Y Furnaces because the Sentry Diamond Block Atmosphere is truly neutral for all steels hardening above 1700°F. It is the correct atmosphere for hardening tungsten high speed steel, it is the *only* satisfactory atmosphere for hardening cobalt and molybdenum steels. Your simple, sure method of eliminating spoilage is to install a Sentry Furnace!

For details, consult our catalog. You will find it packed with cost-saving, quality-improving information about Sentry equipment — a guide to better heat treating, giving *best* answers to your tool hardening problems. Send for it today.

885-T

Sentry ELECTRIC FURNACES

TRADEMARK

Request Catalog C43 · Write THE SENTRY CO., FOXBORO, MASS.

CIRCLE INFORM-A-GRAM KEY NO. 1441

You Can Rely on a ROUSSELLE

THESE **40-TON** PRESSES take job after job in stride and give you top speed and uniform output on a variety of work. They stress simplicity in every detail to achieve quicker set-ups, easier changeovers and simpler operation. All are extra rugged, high precision units, made to withstand hard usage and assure long, satisfactory service. They are *very moderately priced.*

Significant savings may result if you let our engineering staff assist you. There is no obligation.

Rousselle Presses are sold exclusively through leading machinery dealers.

Choice of 25 models in 5 to 40-ton sizes.

Manufacturers of Rousselle Presses

SERVICE MACHINE CO. 2310 West 78th Street • Chicago 20, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1442

"Industrial Dust Control" describes the complete Sly line of dust filters and gives detailed information about dust control systems and how to engineer them. The booklet includes

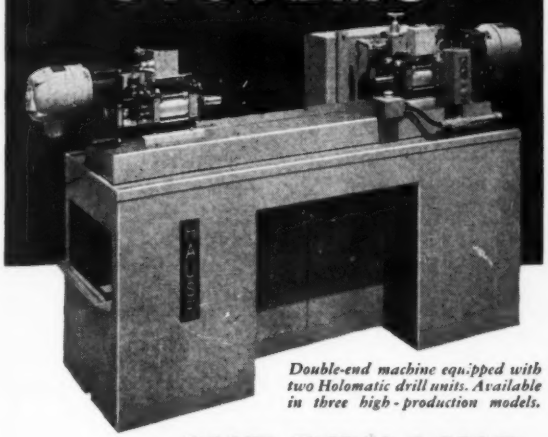
dust filter and complete dust control system specifications as well as extensive hopper and support data. Write to The W. W. Sly Mfg. Co., Cleveland 1, for Bulletin 104, or — **Circle Inform-A-Gram No. B12.**

"Advanced Materials Technology" features technical information on materials to meet severe or unusual conditions in processing or operations, such as extreme heat, abrasive action, corrosion, etc. This issue gives data on a new self-bonded KT silicon carbide which provides high strength and other outstanding properties up to 4000°F. This publication is available from the Research & Development Div'n, The Carborundum Co., Niagara Falls, N. Y., or — **Circle Inform-A-Gram No. B13.**

Trim Parting Line Flash from all types of ferrous and non-ferrous metal and plastic die castings with the trimming presses presented in Bulletin SB68. A feature of the presses is the large working area with low tonnages — 30, 45, 60, and 75 tons. Information on mechanical and hydraulic presses is included. Contact Clearing Machine Corp., Div'n of U. S. Industries, Inc., 6201 W. 63 St., Chicago 38, or — **Circle Inform-A-Gram No. B14.**

Straight Side Crankshaft Presses are fully described in a 48-page catalog, "Series 'S' Presses." Sections include standard construction features, accessory equipment, press selection, specification tables, and special construction features. These presses have 50- to 300-ton capacities. Clearing Machine Corp., Div'n of U.S. Industries, Inc., 6499 W. 65 St., Chicago 38, provides copies of Bulletin 234, or — **Circle No. B15.**

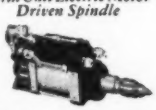
Holomatic SYSTEMS



Double-end machine equipped with two Holomatic drill units. Available in three high-production models.

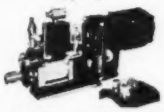
CUT DRILLING-TAPPING TIME

Model 24 — Holomatic Drill Unit Electric Motor Driven Spindle

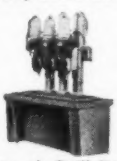


Model 14 — Holomatic Drill Unit Air Motor Driven Spindle

Model 24 — Holomatic Unit For Drilling and Tapping



Model 24—Holomatic for Deep Hole Drilling



Automatic Drill Press: Available in four base lengths with 1, 2, 3 or 4 Holomatic units vertically mounted.

● The modern high-production method for all automatic spindle type operations. Available as individual, self-contained power head units for installation on existing production machinery or as complete base-mounted machines with automatic controls.

Holomatic units operate on shop air line pressures for thrust and feature a self-contained hydraulic system for positive, accurate spindle travel and feed regulation. Traverse and feed rates are infinitely adjustable. Automatic, manual cycling, skip drilling, stops or dwell operations are easily arranged. Built-in air control valve simplifies set-ups and cuts installation time. Holomatic units operate efficiently at *any* angle.

Amazingly versatile, accurate, the Holomatic systems can be quickly and easily set-up for single or multiple operations. A Holomatic system in your plant will quickly and easily pay for itself through savings in time, money and tools.

Survey your production equipment now and visualize how easily and economically a Holomatic unit or complete system could boost your production rates.

Write today for complete information, specifications and prices ... or, ask your Hause representative for an actual, obligation-free demonstration of the Holomatic System right in your plant!

Hause

MACHINES, INC.
MONTPELIER, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1451

TICKLISH FINISHING JOB?

do it better with a Paramount Felt Bob

If you have a tough polishing, buffing, lapping or de-burring finishing problem where tolerances must be held close, solve it by putting a Paramount Bob on the job. Seven custom shapes, 42 sizes, four degrees of hardness from soft to rock hard — there's a Paramount Bob ideal for every close-quarters precision finishing job. For example:

MICRO-FINISHING

Paramount Felt Bobs make ultra-fine finishing of surfaces quick, easy and economical.

DIE AND MOLD MAKING

Thousands of die and mold makers depend on Paramount Bobs to perform precision finishing and buffing operations. Ideal for removing burrs without destroying close tolerances.

NEW BOB ASSORTMENT KITS

K-1 Assortment includes 24 mandrel mounted bobs, 36 small wheels, touch-up pads — 66 pieces all together — packaged in one convenient bench top box. (K-2 Assortment also includes four sticks assorted polishing compounds.)

These handy assortments provide bobs of just the size, shape and hardness you want — and at $10.95 (K-1) and $12.95 (K-2) they are far below the cost of buying bobs separately.

See your jobber or write for literature

BACON FELT CO.
467 West Water St., Taunton, Mass.

JOBBER INQUIRIES INVITED

CIRCLE INFORM-A-GRAM KEY NO. 1452

GAGE COMPANY *Deep-Etch*

PRECISION PLASTIC • NON-BREAKABLE

COMPARATOR SCALES

Highly accurate and designed for making quick measurements at scale on projectors and comparators without any movement of machine or work.

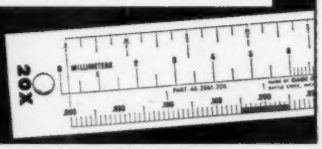
Supplied on Gage Company Precision Plastic . . . a sturdy, non-breakable material of constant stability, .125 in thickness.

Unexcelled as a tool for use in drafting and engineering scale layouts for use on comparators.

Available in all standard magnifications and in several lengths. Various styles for all applications.

WRITE FOR BULLETIN NO. 58-70

GAGE COMPANY
• • • BOX 1080
Battle Creek, Michigan



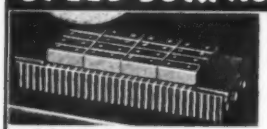
CIRCLE INFORM-A-GRAM KEY NO. 1453

Attach this page to your letterhead
and forward for our new 16-page catalog.

CONICAL TOOL CO. 3890 Buchanan S.W.
Grand Rapids 8, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1461

SPEED SURFACE GRINDING SET-UPS WITH



MAGNE-BLOX
LAMINATED PARALLELS
AND V-BLOCKS
Save Your Magnetic Chucks
Eliminate Clamps
Eliminate Holding Devices

• Grind Work Square
• Grind Work Parallel
• Hold Round Pieces

UNIVERSAL SET IN CASE $31.75

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GEO. SCHERR CO., INC. 200-T Lafayette St., New York 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1462

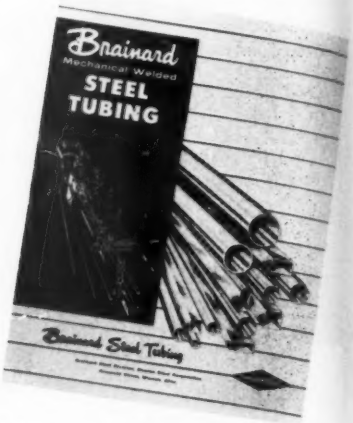
HARDNESS TESTING
has been done with the SCLEROSCOPE
Since 1907
•
THE SHORE INSTRUMENT & MFG. CO., Inc.
90-35 Van Wyck Expressway
Jamaica 35, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1463

JIG BORING
and
Large Precision Machining
Done to your specifications
We Have
22 Jig Borers
KIDDE PRECISION TOOL CORPORATION
10 Locust Ave., Roseland, N J

CIRCLE INFORM-A-GRAM KEY NO. 1464

Mechanical Steel Tubing is the subject of a bulletin containing complete technical working data. Tables show size range, cutting, and size



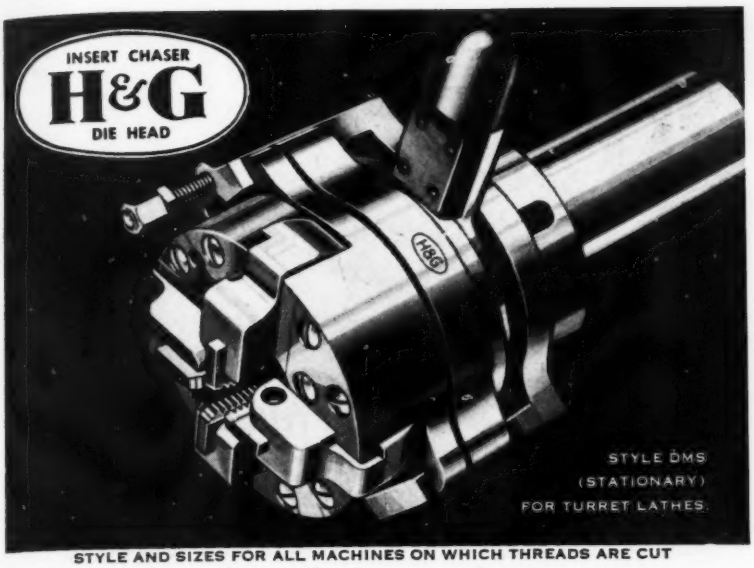
tolerances of round tubing; size ranges, radii of corners, and tolerances of square and rectangular tubing. Direct requests for the catalog to Brainard Steel Tubing Div'n, Sharon Steel Corp., Griswold St., Warren, Ohio, or — **Circle No. B16.**

Reduce Production Costs through the faster removal of metal during cutting operations with the Ceramic VR-97 inserts for negative rake toolholders, described in a 4-page bulletin. The inserts will cut new hard-to-machine metals, and have high strength and great shock resistance. Bulletin 5710 is supplied by Vascoloy-Ramet Corp., Waukegan, Ill., or—**Circle Inform-A-Gram No. B17.**

Tumbling Media for superior barrel finishing is described in a folder along with general applications for aluminum oxide tumbling nuggets and grain and vetrified tumbling pellets. Also discussed are Carbo-Rubs, rubber bonded tumbling media. Direct requests for this folder to Electro-Minerals Div'n, The Carborundum Co., P. O. Box 477, Niagara Falls, N. Y., or — **Circle No. B18.**

"How Abrasive Belt Grinding Increases Production at Lower Cost" is the title of a bulletin from Engelberg Huller Co., 831 W. Fayette St., Syracuse, N. Y. Operating data on ferrous and non-ferrous metals, plastics, glass, etc. is given. Request copies from the company, or — **No. B19.**

100 Sizes of Headed Pins are outlined in a flyer from the Durant Tool Supply Co., Providence 5, R. I. These pins are centerless honed finished, eliminating pickup, and the heads are left soft. The bulletin gives all tolerances and specifications. Write to the company for your copy, or — **Circle Inform-A-Gram No. B20.**



STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

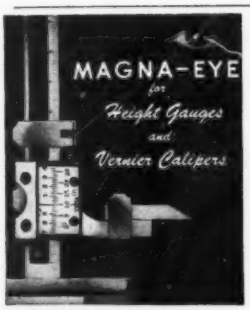
This die head is unique

THERE IS NO OTHER LIKE IT

It cuts threads with insert chasers. These are, in reality, small sections of the business end of large and expensive chasers, but with this important difference: *their cost is so low they can be even thrown away when dull.* For example, for less than $50 you can get a dozen sets of insert chasers, each set ground ready to go. Change now to insert chaser die heads and watch your performance improve. "SELECTING THE PROPER DIE HEAD FOR THE JOB" sent free on request.

THE EASTERN MACHINE SCREW CORP. 29-30 Barclay St., New Haven, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1471



MAGNIFIES "HARD-TO-READ" VERNIER SCALES ON HEIGHT GAGES AND CALIPERS

MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. LENS is finest quality optical glass, specially designed and ground for the purpose with utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many others engaged in defense work. Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. S No. 100 for 6" Vernier Calipers; S No. 200 for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; S No. 300 for most popular type 18" and 24" Height Gages and for 36"-48" 60" and 72" Calipers.

For Complete Information Write, Phone or Wire

STEBAR COMPANY

215-221 28th Ave. North Minneapolis 11, Minn.

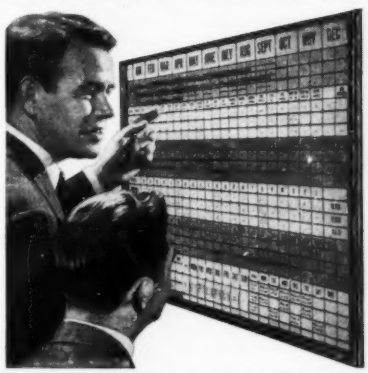
CIRCLE INFORM-A-GRAM KEY NO. 1472

Magnetic Base Indicator holders

CULLEN MFG. CO., RACINE, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 1473

You Get Things Done With Boardmaster Visual Control



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3 TOOLS FOR CUTTING COSTS!!

1. STUDEBAKER HYDRAULIC SPEEDVISE

proven since 1942

Handiest Vise for all around shop use.

Holds work tight and firm. Both hands free. Operated with hydraulic foot pump. Pressure to 7½ tons.

For heavy duty grinding, chipping, and assembling. Ideal for short run forming, bending, testing, stamping, and riveting.

Write for Bulletin No. 2-57

2. STUDEBAKER AIR-HYDRAULIC BOOSTER

Operates from shop air line. Can be installed on machines using standard type of air valves for manual control or automatic operation with solenoid.

Write for Bulletin No. 97

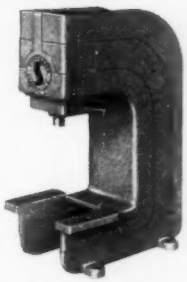
3. STUDEBAKER AIR-HYDRAULIC SPEED PRESS

Will cut production costs.

Saves 75% of air.

Runs off shop air-line.

Ideal for assembly operations.



Ram advances to contact with work, at high speed, before full pressure is applied — NO IMPACT.

4 Models — 1, 2½, 5 and 10 ton.

Write for Bulletin No. 97

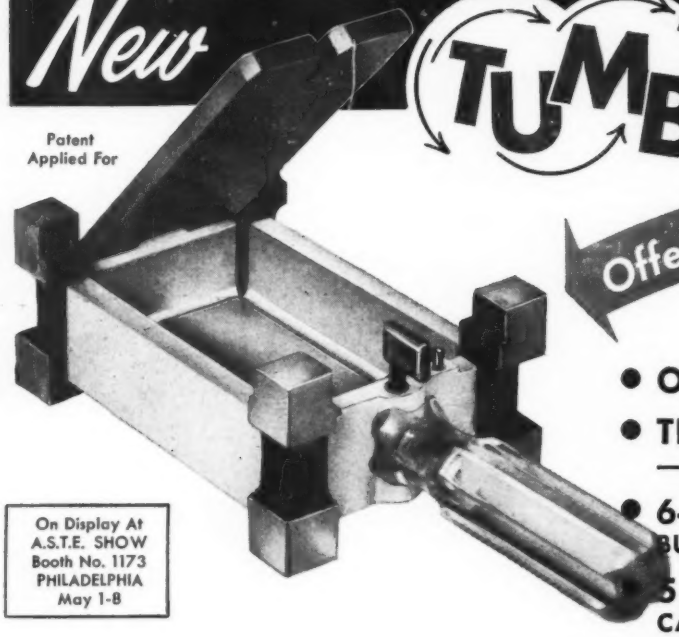
***Studebaker* HYDRAULIC PRODUCTS CO.**

1741 N. 33rd Avenue, Melrose Park, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1475

New TUMBLE BOX JIG

Patent Applied For



On Display At A.S.T.E. SHOW Booth No. 1173 PHILADELPHIA May 1-8

Offers Many Big Advantages

AVAILABLE IN **47** SIZES

- **ONE-HALF THE WEIGHT**
- **TRI-METAL CONSTRUCTION** —ALUMINUM—CAST IRON—STEEL
- **6-SIDE UTILITY**—CAN USE HEAD-TYPE BUSHINGS, ON SIDES, TOP, BOTTOM
- **5 HANDLE LOCATIONS**—HANDLE CAN BE ATTACHED TO ANY SIDE OR BOTTOM
- **ONE HAND OPERATION**—THUMB SCREW RELEASES LID INSTANTLY
- **LEAF "POP-UP"**—AUTOMATIC ACTION SPRING PLUNGER SNAPS LID OPEN
- **STABLE**—RUGGED CONSTRUCTION

Standard Parts is First with Exclusive New "TUMBLE" Jig

Light Weight and Ease of Handling Boost Production, Cut Operator Fatigue

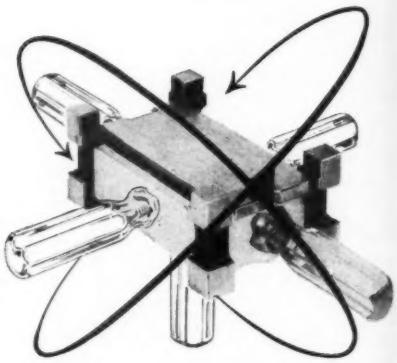
New design features, new engineering concepts, new construction techniques . . . . are incorporated in this outstanding line of "Tumble" Box Jigs. By combining 3 metals—aluminum, cast iron, steel—half the weight has been eliminated. This increases efficiency and production. The sturdy handle (can be located on any side) makes tumbling fast, easy and safe.

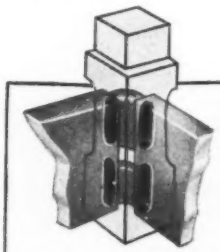
Bushings can be used on all 6 sides. A unique interlocking feature is the aluminum through the cast iron legs, which assures strength and stability. Walls can easily be machined without distorting the Jig. 47 Sizes available 1" x 1" x 1" to 4" x 8" x 4".

Full size Tracing Templates are available for all 47 sizes.

HANDLE (as illustrated) may easily be attached on any side or bottom of the jig as needed.

TUMBLE—Universal tumble direction (as illustrated) is advantage of this lightweight jig — where handle can be located where desired.





Interlocking Leg Joint

Aluminum goes all the way through the cored slots in the cast iron legs—forms a unified, interlocking joint — assuring light weight, but rugged strength.

Ask For TUMBLE JIG Bulletin, Sizes, Prices.

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Please have information on items circled sent to me.

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ADVERTISEMENTS

2	21	40	88	109	149	1081	1195	1284	1382	1483	1552	1721
3	22	41	89	112	152	1082	1201	1311	1383	1484	1561	1722
4	23	42	90	113	153	1083	1202	1312	1401	1471	1571	1723
5	24	43	91	116	161	1084	1203	1313	1402	1472	1572	1724
6	25	45	92	117	164	1085	1204	1314	1403	1473	1573	1761
7	26	47	93	118	165	1101	1231	1315	1421	1474	1574	1791
8	27	48	94	121	168	1102	1232	1321	1422	1475	1575	1792
9	28	49	95	122	169	1111	1233	1322	1423	1501	1576	1793
11	29	50	96	125	170	1112	1241	1323	1424	1502	1581	
12	30	52	97	126	171	1113	1242	1351	1431	1503	1582	
13	31	77	98	129	173	1151	1243	1352	1432	1504	1583	
14	32	79	99	130	175	1152	1244	1353	1441	1511	1584	
15	33	80	100	133	177	1153	1271	1354	1442	1512	1591	
16	34	81	101	134	181	1154	1272	1361	1451	1541	1592	
17	35	83	102	137	182	1191	1273	1362	1452	1542	1593	
18	36	85	103	139	1051	1192	1281	1363	1453	1543	1671	
19	37	86	106	141	1052	1193	1282	1364	1461	1544	1672	
20	39	87	107	148	1053	1194	1283	1381	1462	1551	1673	

EDITORIAL ITEMS

A1	A19	A37	A55	A73	B6	B24	B42	B60	E6
A2	A20	A38	A56	A74	B7	B25	B43	C1	F1
A3	A21	A39	A57	A75	B8	B26	B44	C2	F2
A4	A22	A40	A58	A76	B9	B27	B45	C3	F3
A5	A23	A41	A59	A77	B10	B28	B46	C4	F4
A6	A24	A42	A60	A78	B11	B29	B47	C5	F5
A7	A25	A43	A61	A79	B12	B30	B48	C6	F6
A8	A26	A44	A62	A80	B13	B31	B49	C7	F7
A9	A27	A45	A63	A81	B14	B32	B50	C8	F8
A10	A28	A46	A64	A82	B15	B33	B51	C9	F9
A11	A29	A47	A65	A83	B16	B34	B52	C10	F10
A12	A30	A48	A66	A84	B17	B35	B53	C11	F11
A13	A31	A49	A67	A85	B18	B36	B54	D1	
A14	A32	A50	A68	B1	B19	B37	B55	E1	
A15	A33	A51	A69	B2	B20	B38	B56	E2	
A16	A34	A52	A70	B3	B21	B39	B57	E3	
A17	A35	A53	A71	B4	B22	B40	B58	E4	
A18	A36	A54	A72	B5	B23	B41	B59	E5	

Which article in this issue was of most interest to you? _____

THESE INFORM-A-GRAM CARDS are for the convenience of *TOOLING and PRODUCTION* readers who, we know, rarely have stenographic help at their beck-and-call while reading. To get further information concerning selected items featured — all one needs is an INFORM-A-GRAM card and a pencil or pen to circle the numbers of the items wanted. If there is no identifying number, use the page number.

Our reader service department is handling over 100,000 reader inquiries per year and it is essential that the blanks at the top of each card be filled in accurately and completely. Please use only one of these INFORM-A-GRAM cards for yourself and let one of your associates use the other.

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14	32	79	99	130	175	1152	1244	1353	1441	1511	1584	
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A4	A22	A40	A58	A76	B9	B27	B45	C3	F3
A5	A23	A41	A59	A77	B10	B28	B46	C4	F4
A6	A24	A42	A60	A78	B11	B29	B47	C5	F5
A7	A25	A43	A61	A79	B12	B30	B48	C6	F6
A8	A26	A44	A62	A80	B13	B31	B49	C7	F7
A9	A27	A45	A63	A81	B14	B32	B50	C8	F8
A10	A28	A46	A64	A82	B15	B33	B51	C9	F9
A11	A29	A47	A65	A83	B16	B34	B52	C10	F10
A12	A30	A48	A66	A84	B17	B35	B53	C11	F11
A13	A31	A49	A67	A85	B18	B36	B54	D1	
A14	A32	A50	A68	B1	B19	B37	B55	E1	
A15	A33	A51	A69	B2	B20	B38	B56	E2	
A16	A34	A52	A70	B3	B21	B39	B57	E3	
A17	A35	A53	A71	B4	B22	B40	B58	E4	
A18	A36	A54	A72	B5	B23	B41	B59	E5	

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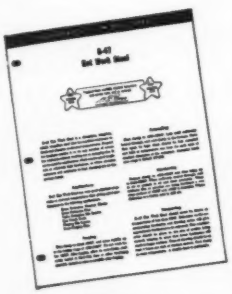
Close-up view of "one-use" rock drill bit and the B-47 die ring which press forges it.

INCREASED ROCK DRILL BIT PRODUCTION 330%



Write for BLUE SHEET on B-47

This concise four-page folder gives all needed handling and shop treatment details on B-47. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. Ask for your copy.

ADDRESS DEPT. TP-3

A midwestern company increased their production of rock drill bits from 1500-3000 per die ring to a consistent total of more than 10,000 bits by switching to Allegheny Ludlum's B-47 die steel.

But of even greater importance, they claim, is the dependability of B-47:

"The less breakdowns we have, the less die changes we must make and the better production we get. Also, we are able to plan our production on the basis of being sure of the reliability of our dies."

Continued high production is necessary to make these special "one-use" bits competitive in today's market. B-47 practically eliminates unscheduled downtime caused by die failure.

A-L's B-47 is a tough hot work steel. It has excellent resistance to shock and abrasion at elevated temperatures. Also, it is especially good for those applications which require ruggedness at relatively high hardnesses.

Check your A-L representative today about Allegheny Ludlum's complete line of tool and die steels—a grade for every job. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh, Pa.***

For nearest representative, consult Yellow Section of your telephone book.

For complete MODERN Tooling, call

Allegheny Ludlum

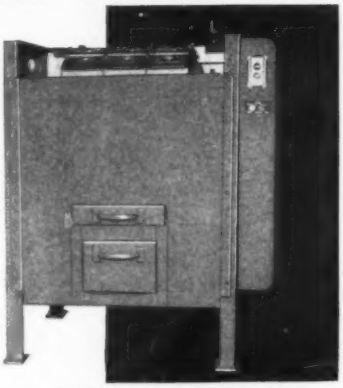
AL FINE TOOL STEELS SINCE 1854

WSW 4647

CRICLE INFORM-A-GRAM KEY NO. 149

NEW, CABINET-TYPE

BARREL FINISHER



- Model DLX combines precision finishing machine, fast media separating unit.
- has multiple compartments — 2.2 cu. ft. total capacity.
- direct chain drive handles heavy loads in deburring, micro-finishing, polishing.

CUT COSTS! Scores of finishing jobs are done faster, easier, and better—with the new Rampe Model DLX. It combines all the heavy-duty features of a high-production barrel finisher and a fast media separating unit. Reciprocating Screen Drawer and Hopper Pan are built-in time-saving features. Others include variable speed, **"No-Seam"** vinyl plastic barrel linings, choice of two or three compartment models, and heavy-duty all-welded construction.

INTERESTING DETAILS are available in new catalog data sheet. Write for your copy today.

RAMPE MANUFACTURING CO.
14917 WOODWORTH AVE., CLEVELAND 10, OHIO

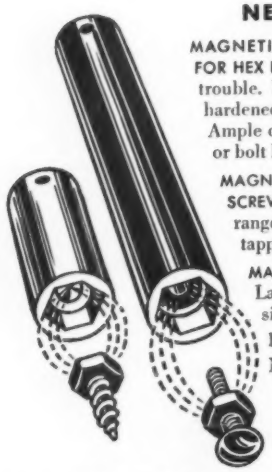
BARREL FINISHERS • SCREEN SEPARATORS • COMPOUNDS • NYLASLUGS

CIRCLE INFORM-A-GRAM KEY NO. 1501

Magna-tip® MAGNETIC SOCKETS

A First Step to Assembly Automation

Speed operations on single or multiple power drivers. Eliminate fumbling and pre-positioning by hand.



NEW! PATENTED!

MAGNETIC BOLT CLEARANCE SOCKETS FOR HEX NUTS—No moving parts to give trouble. Nut held in socket by cup of hardened steel, never touches magnet. Ample clearance for protrusion of stud or bolt beyond nut. U. S. Pat. 2,714,829.

MAGNETIC SOCKETS FOR HEX HEAD SCREWS—Complete size and drive range in proper hardness for self-tapping and sheet metal screws.

MAGNETIC SOCKETS FOR BOLTS—Large range of opening and drive sizes in standard dimensioned power type sockets.

Nut and bolt magnetic sockets available in easy to load surface drive and standard openings.

WRITE Dept. 88-S for manual on the complete line of Magnetic Bit Holders, Finders, Sockets and Hand Screwdrivers. Magna Driver Corp., 779 Washington Street, Buffalo 3, N. Y.

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ARMSTRONG *Carbide* TOOL HOLDERS

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ARMSTRONG Carbide Tool Holders and ARMIDE (Carbide Tipped) Cutters come in cased sets for tool rooms and maintenance departments, and individually in all sizes for general machine shop and production turning. They permit not only the ready machining of sand-filled castings, the hardest and toughest steels as well as many heretofore "unmachinable" materials, but also make practical much heavier cuts and cutting speeds up to 600 f.p.m. on ordinary work. They also run from 10 to 100 times as long between regrindings.

WRITE FOR CATALOG

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"The Tool Holder People"
5220 W. ARMSTRONG AVE., CHICAGO 30, U. S. A.
NEW YORK • SAN FRANCISCO

CIRCLE INFORM-A-GRAM KEY NO. 1503

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Falk Corp.
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Ford Motor Co.
General Electric Co.
Hamilton Standard Div.
Harris Seybold Co.
Homelite Corp.
Hughes Aircraft Co.
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Profit by their experience.

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⅛" to 10" dia.

Find out how they solved it!

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REQUEST BULLETIN 50

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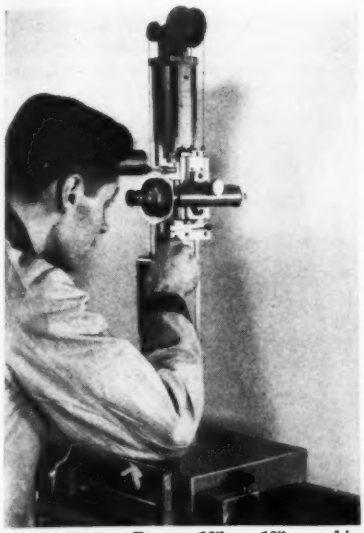


M1238-1818 — *Range 18" x 18", working distance 9" to infinity. Reads to 0.001" up to 24" working distance. Protractor ocular reads to 3 minutes of arc. Image is erect.*

Cut inspection time in half

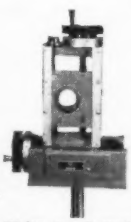
with new Gaertner Coordinate Cathetometers

These convenient, reliable optical instruments permit making precise coordinate measurements in a vertical plane. The two dimensions are measured with one setting, object does not have to be rotated. Inspection time is cut in half and resetting errors eliminated.

Versatile Gaertner Coordinate Cathetometers are ideally suited for precision measurements on large objects; also objects or points in recessed, remote, or inaccessible locations. Applications include measuring jet engine sections, complicated castings, printed circuits, bolt holes and bosses on large piece parts, traces on cathode ray tubes, etc.

Because these are optical rather than mechanical measuring instruments, you make non-destructive measurements without contact, distortion, or concern about pressure being applied to the object when making a setting. Instruments available in English or Metric system.

M1236-46— Horizontal range 6", vertical range 4". Reads to 0.0001", working distance 5" to infinity.



M1236-22— Range 2" x 2", reads to 0.0001". Working distance 5" to infinity. Shown with 19 mm mounting rod, and without telemicroscope. Instrument permits precise coordinate movement of other objects such as photo cells, probes, etc., in place of telemicroscope.

Write for Bulletin 188-53 & 194-57

The Gaertner Scientific Corporation

1242 Wrightwood Ave., Chicago 14, Ill.
Telephone: BUckingham 1-5335

CIRCLE INFORM-A-GRAM KEY NO. 1511

Increase Diamond Wheel Life 20-30% in grinding departments, using the oscillating principle of the Wesson 56-B grinder, described in a bulletin from Wesson Co., 1220 Woodward Heights Blvd., Ferndale 20, Mich. The bulletin also tells how to get 30-50% more tool grinds/hr, obtain better finishes with unskilled operators, and cut tool grinding cost almost in half. Contact the company for your copy of Bulletin PG-257, or—**Circle Inform-A-Gram No. B21.**

Control Brazing Alloy Flow with the Nicrobraz stop-off materials, discussed in an engineering data sheet. Three stop-off materials are listed, and the functions, uses, properties, and solvents are indicated. Application techniques and recommendations for removal of each material following brazing are also included. Wall Colmonoy Corp., 19345 John R. St., Detroit 3, issues copies of Data Sheet 14, or — **Circle No. B22.**

Stop Vibration, shock and noise transmission by using steel spring machinery mountings featured in a catalog from The Korfund Co., Inc., 48-39 E. 32 Pl., Long Island City 1, N. Y. Tables give capacities and characteristics of the Series L mountings. Ask for Bulletin K3B. **No. B23.**

Boring and Cutting Tools are conveniently indexed in a comprehensive 148-page catalog from Davis Boring Tool Div'n, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. Discussions and illustrations, in addition to charts of specifications and dimensions, are given for tools, accessories, and services. Ask for Catalog 304, or — **Circle No. B24.**

An 8-Ton Electro-Safe Press, described as "completely safe in the die area," is outlined in a bulletin. The press can be locked in any desired setting — continuous, single, inch, or foot control — and is recommended for trimming, forming, drawing, embossing, coining, staking, and assembly. Write to Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, for a copy of the bulletin, or — **Circle Inform-A-Gram No. B25.**

Light Sheet Metalworking can be done with the Series F and G foot squaring shears discussed in an illustrated bulletin. They feature rugged steel crossheads, housing, and beds for maximum rigidity and minimum deflection. Cutting lengths and capacities of all models are given in a list of specifications. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, has announced the availability of Bulletin 80-FC. **Circle Inform-A-Gram No. B26.**

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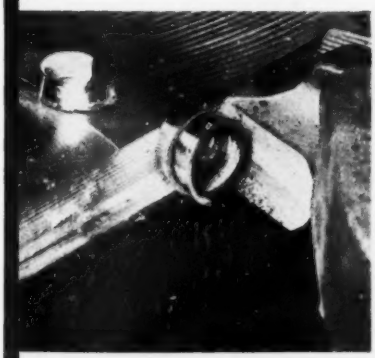

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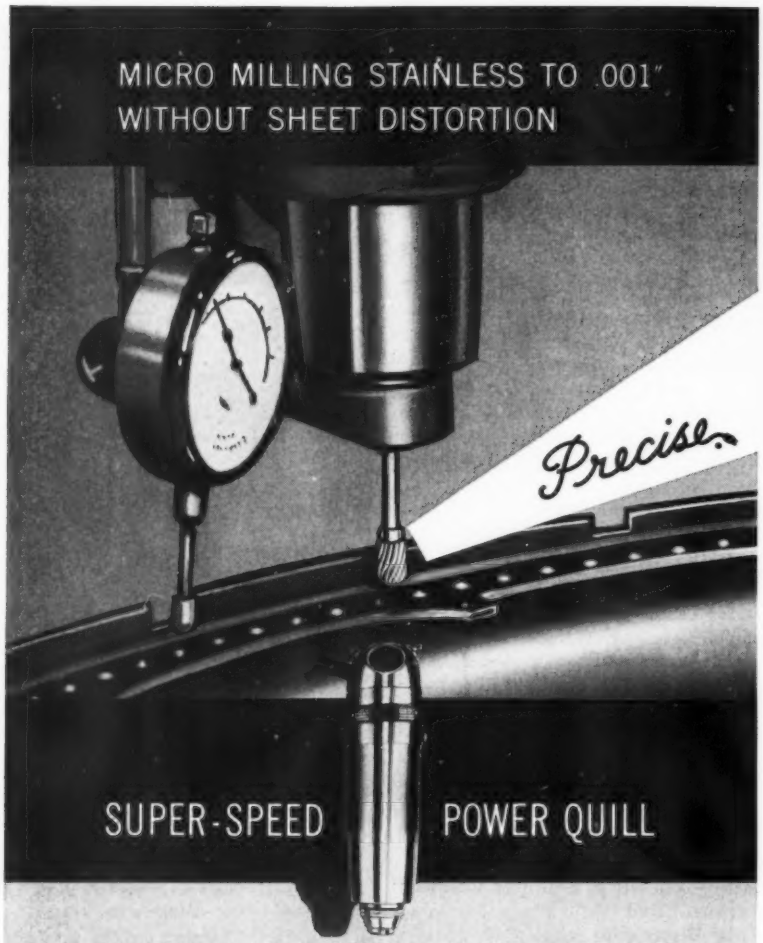

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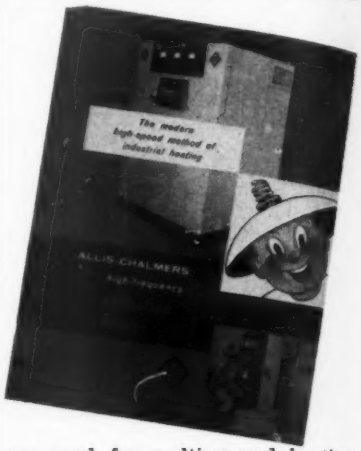
CIRCLE INFORM-A-GRAM KEY NO. 152

High-Frequency Induction Heaters and induction melting furnaces are described in a bulletin which discusses the construction and design features of these units. The heaters



are used for melting and heating, and for forging of ferrous and nonferrous metals. The "Allis-Chalmers High-Frequency Induction Heater" bulletin is available from Allis-Chalmers, Milwaukee 1, or — **B27.**

A Precision Groove Gage for O-ring grooves and snap ring grooves and bores are explained in a folder. Quick adjustment of the balanced gages is an advantage of the product discussed. Specifications and other facts are included. Mueller Laboratory, 1052 N. Allen Ave., Pasadena, Calif., will supply copies of the bulletion, or — **Circle No. B28.**

Chemical Milling Facilities, applications, advantages, and design factors are discussed in a buileltin. The elements of the chemical milling process are given along with a list of the materials that can be milled in this way. For a copy of this bulletin, write to United States Chemical Milling Corp., 1700 Rosecrans Ave., Manhattan Beach, Calif. **No. B29.**

Select Basic Heat Treating Fixtures from a folder from Wiretex Mfg. Co., 10 Mason St., Bridgeport, Conn. It contains specifications on 16 basic units including retorts, baskets, muffles, trays, and boxes. Fixtures for pit type, brazing, sintering, and surface furnaces are included. Write to the company for Catalog M-7, or — **Circle No. B30.**

For Better Surface Finishes, use the precision grinding machines offered in an illustrated bulletin. Rotary surface, external, and internal grinders, and the Jigmatic tape controlled positioning table are discussed. Contact Arter Grinding Machine Co., 26 Sagamore Rd., Worcester 5, Mass., or — **Circle No. B31.**

Hydraulic Surface Grinding can be done with the horizontal spindle, vertical spindle, or extra heavy-duty double housing models covered in a bulletin. Also included are specifications on special precision way grinders. Illustrations accompany construction details and features. Write to The Hill Acme Co., 1201 W. 65 St., Cleveland 2, for copies of the catalog. **Circle No. B32.**

Die Set Accessories are offered in an 8-page catalog from E. W. Bliss Co., 1400 Brookpark Rd., Cleveland 9. Included are specifications for hard-steel drills, transfer screws, layout fluid, die rubber, lock washers, and spherical washers. Also discussed are cast iron hand knobs, pry bars, and various types of screws and bolts. Write to the company for a copy of Catalog 70-A, Section 5, or **Circle Inform-A-Gram No. B33.**

The Benefits of Membership in the National Tool & Die Manufacturers Association are explained in a 24-page booklet. "Come Right In." The association's ability to provide valuable individual assistance in business management and administration is described. Write to The National Tool & Die Manufacturers Assoc., 907 Public Square Bldg., Cleveland 13. **Circle Inform-A-Gram No. B34.**

Die Sets and Accessories are outlined in a catalog published by Standard Die Set Co., 1485 Elmwood Ave., Providence 7, R. I. A thumb index makes information on bushings, shanks, posts, springs, etc. easy to find. A supplementary booklet gives specifications and diagrams of die sets. Straight-sided die sets are catalogued for fast selection by dimensions of required tooling area. Catalog 570 is supplied by the company, or — **Circle No. B35.**

Protect Ways, Cross-Rails, and spindles from chips, dust, and grit with the Gorite-Way protectors. Fabricated from neoprene-base materials, this accordion type protection can be supplied in any size. Dimensions and applications are included in the bulletin. Write to A & A Mfg. Co., 712 S. 12 St., Milwaukee 4, Wis., for copies of Bulletin GW-100, or — **Circle Inform-A-Gram No. B36.**

Fasteners, Blind Rivets, and Driving Tools for commercial and industrial application are described in a 12-page catalog. Features, specifications, and uses of the full line of Huck commercial fasteners are included along with the driving cycle for each fastener type. Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Mich., supplies copies of Catalog 8-416, or — **Circle No. B37.**

Grind 1¾" to 5" Dia Drills with the 10-G drill grinder discussed in an illustrated bulletin. The principle of drill grinding, as well as the design and construction features of the grinder, are presented. Specifications for the grinding machine are also included. Contact Consolidated Machine Tool Div'n, Farrell-Birmingham Co., Inc., 565 Blossom Rd., Rochester 10, N. Y., for copies of Bulletin 4400, or — **Circle No. B38.**

A New Mounted Wheels Catalog has been released by Bay State Abrasive Products Co., Westboro, Mass. General information with regard to grinding action, wheel markings, grades, bond types, abrasive types, structures and operating instructions are discussed. Specification recommendations are also included. Write to the company for your copy of the catalog, or — **Circle No. B39.**

Machines, Tools, Fixtures, abrasives, and coolants for cylindrical, spherical, and flat Microhoning applications are presented in a 32-page service and equipment catalog. It contains an explanation of the Microhoning process, plus capacities and specifications of the equipment. Contact Micromatic Hone Corp., Detroit 38, for copies of the catalog. **No. B40.**

Automatic Ram Type Turret Lathes with hydraulic drives are detailed in a bulletin from Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis. Economical setup, automatic cycle stop, reverse feed, and Recipromatic hydraulic action are among the features described. Other features and specifications are included. Request Form 1182-A. **Circle Inform-A-Gram No. B41.**

Bright Carburizing, Cyaniding, and hardening at temperatures to 1900°F can be done with the high temperature shaker hearth furnace discussed in a bulletin. These furnaces provide automatic conveying of parts through the furnace chamber without the need of reheating a conveyor chain or belt. Bulletin HD-1057 is available from Hevi-Duty Electric Co., Milwaukee 1, or — **B42.**

An Automatic Line Transfer Machine, developed to perform three types of operations on a V-type crankshaft, is discussed in a bulletin. The complete sequence of operations is detailed and illustrated. Also discussed are line and rotary transfer machines and special production machines. "Production Machine Tools" is available from The Producto Machine Co., 990 Housatonic Ave., Bridgeport 1, Conn. **Circle No. B43.**

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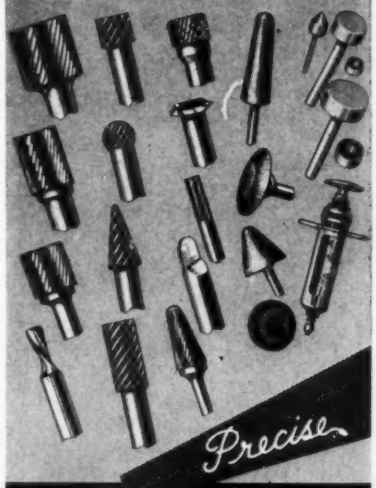

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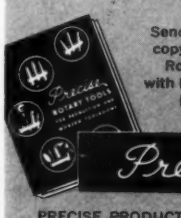

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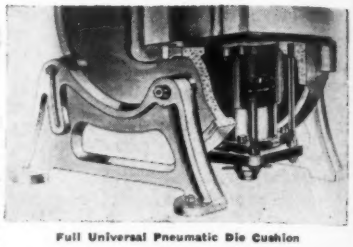

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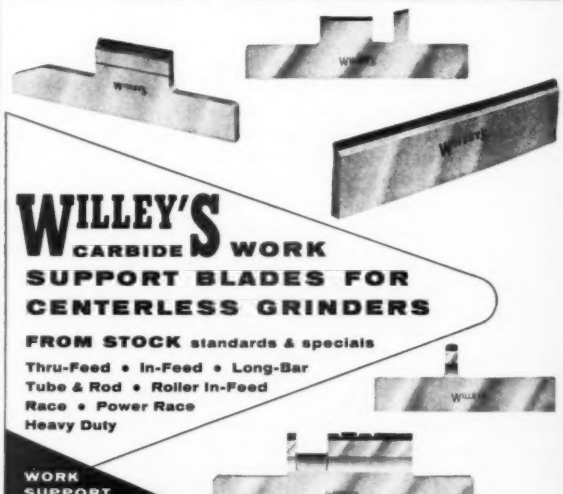

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CIRCLE INFORM-A-GRAM KEY NO. 1544

A "Tooling Tips" Sheet describes solid carbide single flute countersinks, double-end countersinks, and center drills. Details on the various types and sizes are presented. They can be used on all types of materials, including heat treated metals. Write to Wendt-Sonis Co., Hannibal, Mo., for your copy of this sheet. **No. B44.**

Extra Working Capacity for Bigger Jobs is one of the features of the Covel No. 80 hydraulic surface grinder introduced in a bulletin. It will grind work 16" x 36" x 18½" high under a 14" grinding wheel, at table speeds from 10 to 90 sfpm. Bulletin 807 is being distributed by Covel Mfg. Co., Benton Harbor, Mich., or — **Circle No. B45.**

No Preheating is necessary to weld T-1 steel, presented in a 64-page catalog. This steel has three times the yield strength of structural carbon steel. Engineering data, metallurgical characteristics, fabrication practices, and applications are given in the illustrated catalog. U. S. Steel Corp., 525 William Penn Pl., Pittsburgh 30. **Circle No. B46.**

Punch Press Accessories are discussed and the features of the devices are outlined in a new bulletin. Automatic stock reels, scrap choppers, automatic press feeds, and roll feeds are among those presented. Specifications and capacities are included. For copies of the bulletin write to Jaco Devices, Inc., 101 High St., Hingham, Mass., or — **No. B47.**

For Easy Welding and Fast Machining use Alloy "775" cast aluminum tooling plate, outlined in a bulletin which lists specifications and gives a number of applications. The product is lightweight, stable, and has a high salvage value. Contact Red Seal Metals Co., 10035 Burtis St., South Gate, Calif., for your copy of this catalog. **Circle No. B48.**

A Mechanical Variable Speed Reducer and Control is the topic of a bulletin which explains what it does and how it works. A number of typical applications of the Zero-Max are illustrated, and dimensions and line drawings of the regular types are included. Revco Inc., 1900 Lyndale Ave., S., Minneapolis 5, supplies copies of this bulletin. **No. B49.**

Big Deburring and Cleaning Jobs, as well as small ones, can be done fast and at low cost with the Situft and Helituf brushes, discussed in a folder. Specifications, advantages, and illustrations of these brushes are given. The folder is available from The Osborn Mfg. Co., Cleveland 14. **Circle Inform-A-Gram No. B50.**

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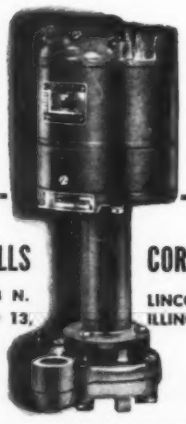

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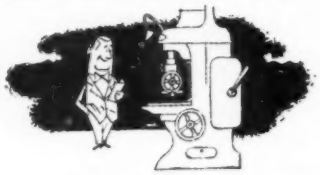

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Tool Holders and Indexable Inserts are outlined in a bulletin which has special sections on negative rake, and positive rake inserts. Also, included is a section on replaceable parts and other inserts. A chart shows the comparison of properties of the Carmet steel cutting carbides, for easy selection. Write to Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, for a copy of this bulletin, or — **Circle No. B51.**

Porting Tools, Carbide Reamers, and gang milling cutters are among the different tools discussed in a catalog. There is also a section on special tools which include a gun reamer, spiral flute reamer, high speed piloted roughing and finishing reamers, and carbide step reamers. Obtain this catalog from Wetmore Tools, 5320 E. Washington Blvd., Los Angeles, or — **Circle No. B52.**

Speed Tooling and Patternmaking Operations through easier height block handling, using the lightweight magnesium and aluminum blocks described in a bulletin. The units are available in four standard heights: 5", 10", 15", and 20", with tops 8" sq. Other specifications are in Publication 824 from The Challange Machinery Corp., Grand Haven, Mich., or — **Circle No. B53.**

Standard Flush Pin Gages and special indicating and gaging fixtures are discussed in a catalog which includes technical data on the two basic types of gages. Line drawings and specifications are provided for finished bar gages, bar type gage blanks, barrel type gages, and standard indicator depth gages. The catalog is released by Rite-O Tool and Gage Co., 321 W. Ten Mile Rd., Hazel Park, Mich., or — **Circle No. B54.**

Ball Bearing Screws and Splines are detailed in a bulletin which discusses advantages, applications, features, screw characteristics, etc. Standard assemblies, custom-designed assemblies, and couplings are illustrated and dimensions are included. Direct requests for copies of this bulletin to Saginaw Steering Gear Div'n, General Motors Corp., Saginaw, Mich., or — **Circle No. B55.**

Double- and Triple-Action Hydraulic Metal Working Presses for versatile, low cost, deep drawing are discussed in a bulletin which outlines applications and advantages. Illustrations and general specifications are included for the 75- to 4000-ton presses. Lake Erie Machinery Corp., Box 68, Kenmore Sta., Buffalo 17, N. Y., will supply copies of Bulletin 7.13, or — **Circle No. B56.**

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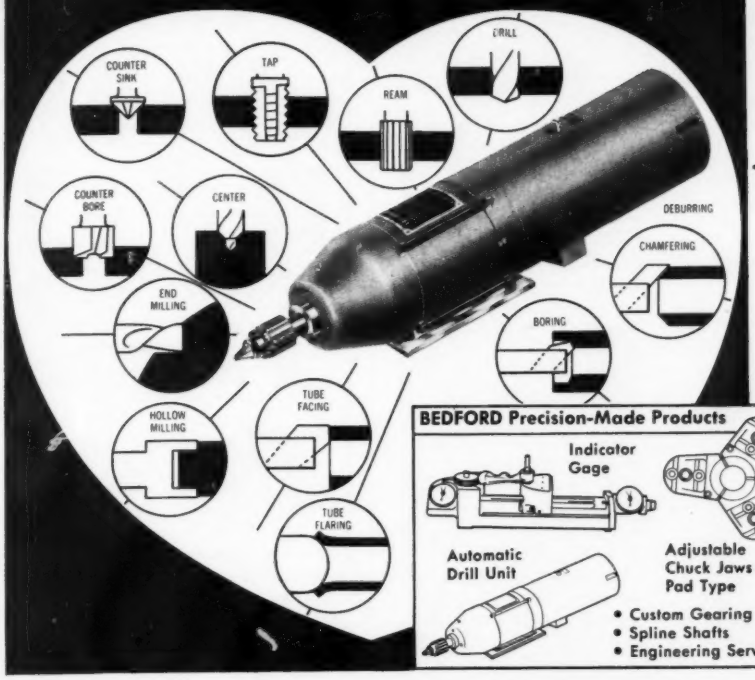

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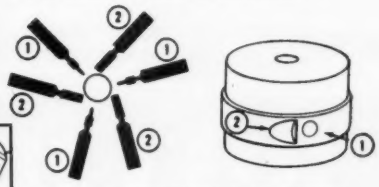

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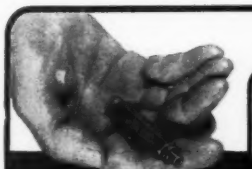

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LEAD HAMMERS—Buy Cook "SHUR-GRIP"

They're a MUST in every shop where many blows have to be struck without marring surfaces. Available with "SHUR-GRIP" drop forged handles.

COMPLETE LEAD HAMMER SERVICE

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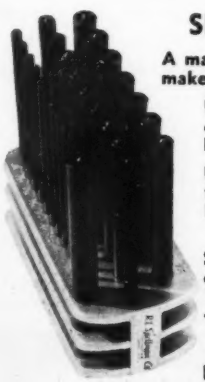

SPELLMACO SPOTTERS

A matched set of transfer punches for toolmakers, machinists and tool cribs.

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel carefully heat treated and tempered for long life. .0025 undersize to facilitate use—black oxide finish.

Set No. 3-17: 28 punches with indexed stand—sizes 3/32" to ½" by 1/64" plus hand 17/32" size—length 4⅞". PRICE only $17.90

Single size available.

R. L. SPELLMAN CO. • Urbana, Ohio

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NOW GET CLEAN SURFACED PARTS FROM YOUR AUTOMATICS . . . UNMARRED BY TOOL WITHDRAWAL MARKS

THE NEW RELIEVOMATIC SELF-RELIEVING TOOL HOLDER

SAVES YOU COSTLY SECONDARY FINISHING OPERATIONS

Avoid scratches like this

All clear with "Relievomatic!"

Easily installed on cross-slide or turret

Write today for details.

SILBER PRODUCTS, INC. Nightingale 9-8600
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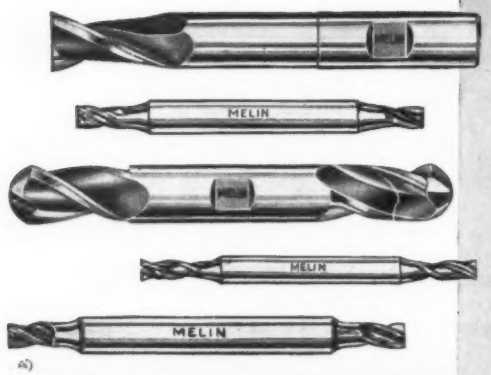
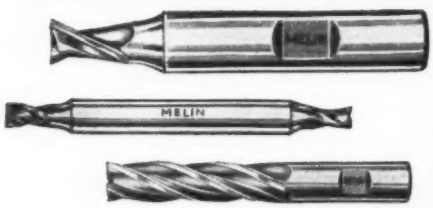


MELIN END MILLS

There is a difference in end mills . . . MELIN end mills! Proof of this is evident in the continued increase in MELIN popularity. The growth in MELIN tool acceptance was by no means an accident . . . The secret is in *CONSISTENT QUALITY*. This standard of Quality assures you better performance . . . longer lasting performance . . . CONTINUOUSLY . . . from one shipment to another. Next time you order end mills . . . specify the finest . . . specify MELIN.

MANUFACTURED IN TWO, THREE AND FOUR FLUTE TYPES.



Representatives in principal cities.

MELIN TOOL COMPANY, INC.
3371 West 140th Street
Cleveland 11, Ohio

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Why SCHNORR Disc Springs?

BECAUSE

1. Unlimited life within borders of permissible loads.
2. No creeping, initial settling or gradual fatigue.
3. Axial center pressure.
4. Exact adjustment to the desired pressure.
5. Small construction height, large deflection.
6. Large inherent damping.
7. Large impact damping especially with multiple stacking.
8. Excellent space disposition.
9. Spring pressure, Spring length and Spring deflection can be easily determined for the same Spring size or can be changed by lengthening or shortening of the Spring columns or by multiple stacking. In special cases the character line can be made to divert from its usual straight form by diversified stacking.
10. Most spring sizes available from stock.

"Sole U. S. A. Representatives"

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NEISE MODERNTOOLS

CIRCLE INFORM-A-GRAM KEY NO. 1582

DEPENDABLE ACCURACY

INSPECTION TOOLS made of MEEHANITE METAL are designed to fill your various Inspection and Checking needs. Sturdily constructed to give you reliable, accurate service.

ACME TOOL CORP.
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CIRCLE INFORM-A-GRAM KEY NO. 1583

NOW YOU CAN HAVE A PULLMAX DEMONSTRATION IN YOUR OWN PLANT

TO HELP YOU SAVE TIME—LABOR—MATERIAL

PULLMAX
DOES ALL THESE OPERATIONS

Write for Literature on Metalworking Ideas.
Write, wire or call and we'll send a demonstration unit right to your plant.

AMERICAN PULLMAX CO., INC.
2469 N. Sheffield Avenue Chicago 14, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1584

"Corrosion Resistance of Copper and Copper Alloys" is a 32-page revised booklet announced by The American Brass Co., Waterbury 20, Conn. A tabulation is given indicating the relative corrosion resistance of the principal types of copper and copper base alloys when in contact with 186 different corroding agents. Publication B-36R is available from the company, or — **B57.**

Drilling and Tapping Machine Accessories, designed to make present machines more versatile and more efficient, are described in a bulletin. Descriptions and specifications for turret depth stops, telescopic spindle guards, fine feed attachments, tee slots, cam feeds, coolant systems, etc., are included. Bulletin AC is issued by Edlund Machinery Co., 50 Huntington St., Cortland, N. Y., or— **Circle Inform-A-Gram No. B58.**

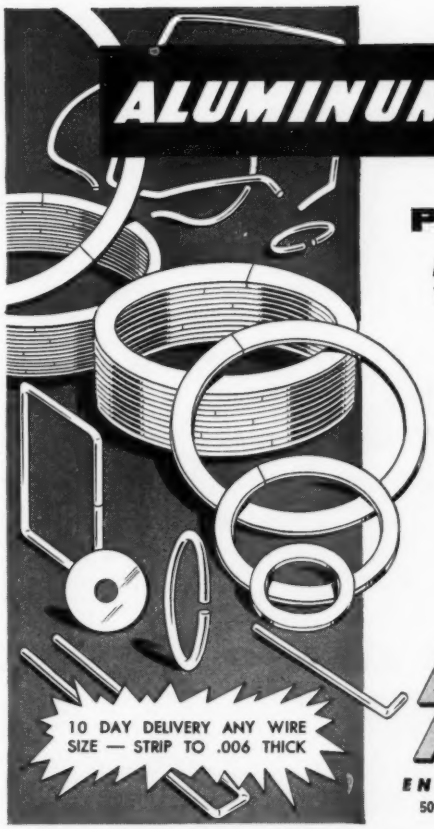
Ease Spring Plunger Problems with the items discussed in a bulletin. Use them for jigs and fixtures, as detents, die ejectors, etc. The bulletin also contains specifications and dimensions for ball plungers, swivel-pad clamps, torque thumb screws, and fixture keys. Contact Vlier Engineering Corp., 8900 Santa Monica Blvd., Los Angeles 46, for copies of Catalog 57A, or — **No. B59.**

"High Temperature Springs" is the title of an informative bulletin which tells how to design and select materials for springs that must operate successfully at high temperatures. Solution to problems by proper selection of materials, choice of design stresses, and the use of certain manufacturing processes such as heat setting, are discussed. Write to Associated Spring Corp., Bristol, Conn., for your copy of this bulletin. **Circle Inform-A-Gram No. B60.**

Hammond Machinery Builders, Inc. is putting a completely equipped bus on the road to demonstrate its electrolytic tool and chip breaker grinders. These grinders reduce consumption of diamonds by 80% to 90% and provide easy and fast grinding of carbide tools.

———•———

C.I.T. Corp., an industrial financing firm, has opened a new division office in Denver, Colo. It is headed by Paul F. Franklin, who has been elected vice president of the company, and Claude S. Allcutt, who has been elected assistant secretary.



ALUMINUM Brazing?

LUCAS-MILHAUPT
PREFORMS

In Sizes And Shapes To Do Your Brazing Job Better

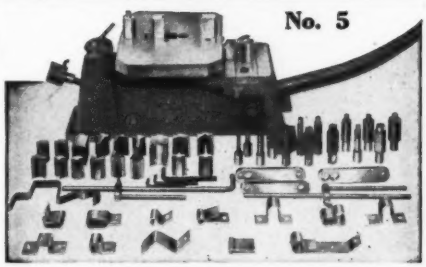
1 NOTCH COIL RINGS-No Tangling Problems
2 EDGEWOUND WASHERS-No Blanking Scrap Losses
3 BLANKED WASHERS-Close Tolerance From Thin Sheet
4 SPECIAL SHAPES-Rectangles, Ovals, U-clips, Segments and Many Others

AVAILABLE IN THESE ALCOA ALLOYS
718 Brazing Wire and Sheet
716 Brazing Wire
713 Brazing Sheet

10 DAY DELIVERY ANY WIRE SIZE — STRIP TO .006 THICK

LUCAS MILHAUPT
ENGINEERING COMPANY
5091 SOUTH LAKE DRIVE, CUDAHY, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 1591



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Multiform
BENDER-CUTTER
CUTS, BENDS, PUNCHES

Available in hand, air or hydraulic models. The MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to ⅛" x 1½" as illustrated. Punching dies available. Other models up to ½" x 8" hydraulic operated. Ideal for steel rule die forming.

ALSO AIR OPERATED MODELS

J. A. RICHARDS COMPANY
KALAMAZOO, MICH.

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BUSHINGS YOU GET QUALITY...
PRECISION...AND FAST DELIVERY!

Send me your FREE drill bushing SELECTOR.
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CIRCLE INFORM-A-GRAM KEY NO. 1593

How Earl Singleton cut the cost of g

With 28 years experience in the abrasives industry, Bay State distributor Earl Singleton figures that one improvement in a grinding operation ought to lead the way to another. And, judging by the results he's produced, he's 100% right.

This is a good example of what happens when you tell a Bay State distributor your problem and give him a chance to experiment.

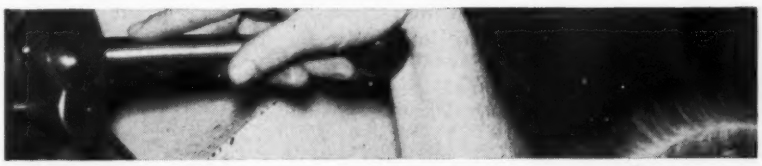
The problem: Grinding teeth on heavy traction gears for diesel locomotives at the Indianapolis plant of a large manufacturer of components for diesel locomotives.

The man: Earl Singleton, Abrasive Engineer at Browning Tool & Supply Co., Indianapolis.

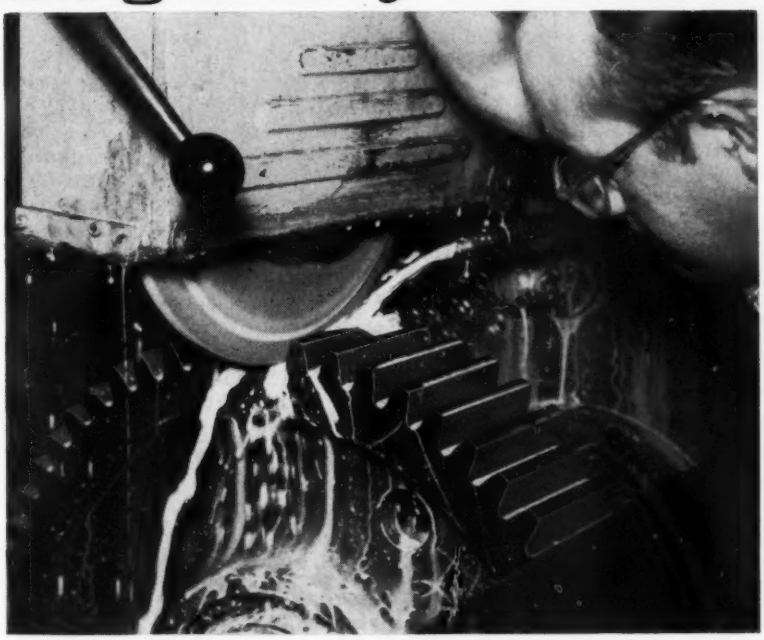
Working with the foreman of the department, Singleton came up with a 14" grinding wheel that cost 14% less than the premium-priced wheel it replaced. It held form better, too, and so didn't need to be dressed as often.

That was fine. But Singleton figured they might also get more pieces per wheel if they used a slightly larger wheel. After exhaustive tests to ensure complete safety, a 15" wheel was put to work and wheel life was more than doubled . . . from 16-17 pieces to 35-36. Down-time was reduced, too.

Even if you seem to have no particular grinding problems at the moment, it's worth while getting acquainted with the Bay State distributor in your area. Like Earl Singleton, he may find ways to save you money that haven't occurred to the people in your shop. *Better grinding at lower cost — that is his business.*



grinding heavy traction gears



Bay State specification cut wheel cost 14% . . . *and* wheel held form so well that wheel life was doubled under regular production conditions.

BAY STATE WHEELS of PROGRESS

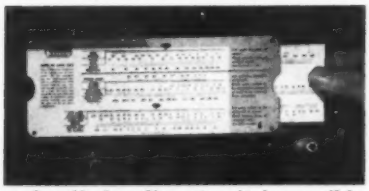
BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

CIRCLE INFORM-A-GRAM KEY NO. 161

SHOP AIDS

A Honing Computer, designed to calculate honing times on any size cylinders, shows surface speed, stone selection, approximate removal rates, and how much stock to hone. By setting the work diameter



and cylinder diameter it is possible to compute the honing time in minutes and removal rate in cu in/min. C. Allen Fulmer Co., 1200 First National Bank Bldg., Cincinnati 2, Ohio., will supply the computer.
Circle Inform-A-Gram No. C1.

Check Angles, Surface Flatness, and parallelism with the Opto-Tooling Auto-Collimator highlighted in a bulletin. Directions on how to work the instrument and explanations of applications, with diagrams, are listed. Included are specifications of the different models. Write to the George Scherr Co., Inc., 200 Lafayette St., New York 12, or—
Circle Inform-A-Gram No. C2.

"A Complete Line of Leaded Steels" is the title of a catalog which gives the advantages, characteristics, and mechanical properties of the products. There is also a discussion on how leaded steel is worked. Machinability and chemistry in chart form is given for leaded alloy, also. Contact Copperweld Steel Co., Steel Div'n, Warren, Ohio, for copies of the catalog, or—
Circle Inform-A-Gram No. C3.

Where and How to Use Tantung cast alloy in the form of solid tool bits, tipped tools, cut-off blades, toolholder inserts, preformed tools and blanks, and for many wear applications, is described in a 12-page booklet. Tantung tooling for automatic screw machines and other modern high production machines, are also discussed. Vascoloy-Ramet Corp., Waukegan, Ill., supplies copies of Booklet 573, or—
Circle Inform-A-Gram No. C4.

A Saw Blade Selection Chart is available from The DoAll Co., Des Plaines, Ill. It lists the various sawing factors affecting cutting rate, tool life, and finish, and shows the steps to proper blade selection and methods used to control these sawing factors for job requirements. Included are recommended cutting rates for carbon steel and high-speed steel band saws in relation to material work thickness. Contact the company for a copy of this chart, or—**Circle Inform-A-Gram No. C5.**

A Brazing Aid, Braze-Clad, a combination of base metals clad with silver brazing alloys, is presented in a bulletin. Case histories point out how Braze-Clad assures a uniformly controlled, sound joint with no voids or oxide islands. Write to American Silver Co., 36-07 Prince St., Flushing 54, N.Y., for copies of Bulletin BC-51, or—
Circle Inform-A-Gram No. C6.

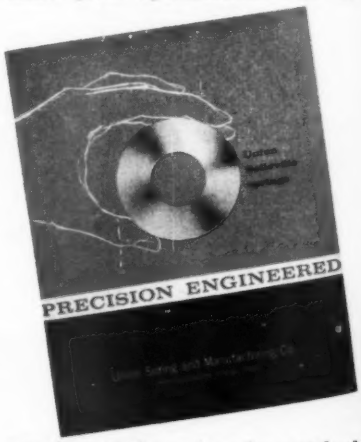
A Condensation of the American Standard Identification Code for diamond wheels, and complete showing of wheels and hones, are presented in a catalog. Included are authoritative recommendations for selection, care, and use which should effect savings in wheel and grinding costs. Contact The United States Diamond Wheel Co., Aurora, Ill., for copies of Catalog 957, or—
Circle Inform-A-Gram No. C7.

A Hydraulics and Lubrication Manual for automated special machine tools is now available from Snyder Tool & Engineering Co., 3400 E. Lafayette Ave., Detroit 7. Line drawings accompany descriptions of head lubrication and oil mist lubrication systems, a rotary index table hydraulic system, and a trunnion index hydraulic system. Instructions for general hydraulic and lubrication system maintenance are included, along with a discussion of lubricants and a lubrication chart. Write to the company for your copy of Bulletin 8, or—
Circle Inform-A-Gram No. C8.

Keep Downtime to a Minimum using the tips in the "Preventive Maintenance Service Manual." It offers a handy 32-point check-list which helps industrial truck users avoid unnecessary repairs, and aids them in spotting trouble before it starts. The manual outlines a comprehensive preventive maintenance program that provides in-plant servicing by factory-trained personnel. Towmotor Corp., Cleveland 10, supplies copies of Bulletin SP-18, or—
Circle Inform-A-Gram No. C9.

Select Plain Cylindrical Plug Gages, progressive limit plug gages, thread plug and ring gages, and gage blanks from a catalog from Rite-O Tool & Gage Co., 321 W. Ten Mile Rd., Hazel Park, Mich. Charts list specifications and dimensions of these products, and there is a discussion of work tolerances, gage tolerances, the principle of fixed gages, and gage care, with diagrams. Write to the company for your copy of this Gage Primer, or—
Circle Inform-A-Gram No. C10.

Belleville Springs are detailed in a catalog which gives the features and lists the end uses of them. A chart gives specifications and di-



mensions of the springs for standard and high strength bolts, and of bronze springs for standard bolts. This catalog is available from Union Spring and Mfg. Co., New Kensington, Pa., or—
Circle Inform-A-Gram No. C11.

ALUMINUM CAN DRAWING TECHNIQUE HAS SINGLE OPERATION

Among several aluminum can-making techniques which Kaiser Aluminum is developing is a new deep drawing process, which produces a seamless aluminum can body and bottom in one piece.

Because of its high protective qualities and attractive appearance, the seamless aluminum can is expected to find widespread use. Other advantages for the aluminum can include its light weight which will help reduce shipping costs, its ability to be opened easily, and its adaptability to special shapes and sizes. Although unit cost may be higher initially in some instances, aluminum cans will be entirely competitive with other types of containers where it is possible to make effective use of aluminum's unique properties.

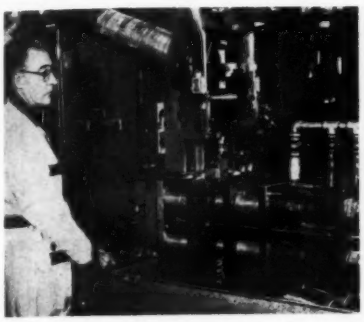


Fig. 1. The press shown here forms the can bodies by drawing aluminum discs through cupping, ironing, and bottoming dies automatically in a single stroke of the punch.

Under conventional drawing methods, it usually is not possible to perform a greater draw than 50% of the diameter in one stroke. Thus several forming operations are required to bring the can body to its desired shape and size. With the Kaiser Aluminum method, however, the can body may be formed in a single operation. In fact, they produce seamless can bodies with a depth of up to three times the diameter, in a single stroke. This technique also makes possible the production of rigid durable cans with walls as thin as 0.005".

With the new process it is easy to vary the size and shape of deep drawn cans for production on the same equipment. The new can-making unit also requires only a small fraction of the floor space required by conventional equipment. From the standpoint of protection, the fabrication of a seamless can body from a single disc of aluminum virtually eliminates the danger of leakage, and its non-sparking characteristic makes it an ideal container for inflammable materials. The new cans have a highly polished surface as they come off the press, thereby eliminating the need for finishing.

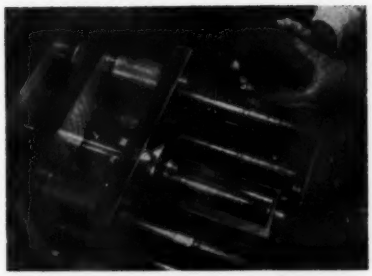


Fig. 2. This closeup shows the final stage of the continuous drawing operation. The disc being held is drawn to the can seen on the punch.

In addition to the deep draw process, Kaiser Aluminum is perfecting other methods of producing aluminum containers. Cans made for the Air Force were produced by a method developed for making cans from coil stock in which one die blanks, forms, trims, sizes and flanges in a single operation. Although these are shallow cans with a depth less than their diameter, they have excellent possibilities for many packaging uses.

TUBING ROLL FORMED AT HIGH SPEED

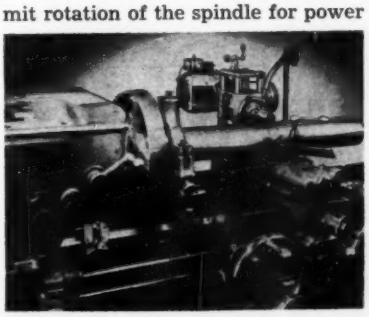
A tube mill is now producing commercial aluminum tubing at the rate of 260 fpm, the highest continuous-production speed known in this application. Installation of the 2½" OD capacity tube mill was made recently at JFD Electronics Corporation, where tubing is produced for television antennas, masts, outdoor furniture, and clothes dryers. The mill-run tubing requires no further finish-processing.

The Abbey Etna Machine Company tube mill can produce tubing from different metals, with no adjustments to the mill itself other than to regulate speeds to suit welding requirements of various types of metals. Good results were found in producing brass-coated steel tubing used in a line of outdoor furniture. Current production, however, is mainly 1" OD round and 1" square aluminum tubing with wall thicknesses ranging from 0.025" to 0.050".

COMPACT UNIT COMBINES OPERATIONS

Without removing a 4" dia shaft from the lathe, a keyway ¾" x 1¼" x 24" is milled by means of a portable precision machining unit called the Dumore Versa-Mil. This small compact unit is mounted on the rear of the cross-slide of a 14" Reed-Prentice lathe.

The lathe feed screw supplies power feed at the rate of 4"/min, and the lathe steady rest is restraining the shaft from turning while the lubricated dead center is used to permit rotation of the spindle for power feed. The milling cutter is mounted in a Morse taper spindle, and a ¾-hp motor powers the milling cutter.



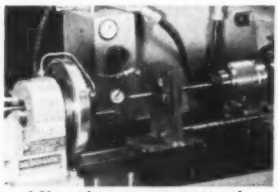
With integral power and feeds, the device is capable of performing milling, boring, shaping, slotting, grinding or drilling operations at any angle, in any position or direction. It may be used as an independent unit or added to lathes, planers, shapers, millers, or grinders. Accessories for many other machining operations are also available.

WHY "150" HYDROHONER

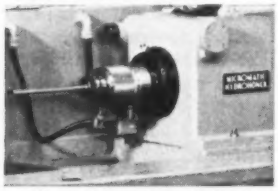
Reduces Costs . . .
Assures Controlled Finish . . .
Provides Rapid Stock Removal

To assure rapid stock removal and consistent generation of surface finish desired, the low-cost "150" Hydrohoner utilizes the distinctive Microhoning characteristic of self-dressing abrasives. Because abrasive grits are kept sharp-cutting at all times by a combination of controlled pressure and reciprocating-revolving motions of tool, a constantly high cutting efficiency is effected.

Basic "150" Hydrohoner —delivered from stock.



Microsize gage automatically ends cycle when exact size is reached.



Microdial automatic feed control and stone wear compensation.

Possessing a 12-inch stroke and a work diameter capacity of 1½ inches, the standardized "150" readily accommodates a variety of fixturing and tooling to assure easy adaption to a wide variety of work parts. Also, by addition of standard packaged units produced by Micromatic, it can be partially or fully automated.

Performing to the standards of higher-priced, special-purpose honing machines and incorporating features of a general-purpose design, the "150" Hydrohoner is an economical, long-range investment for long or short production runs.

Send Coupon for Complete Information.

Learn why Microhoning will give efficient stock removal, closer tolerances, accurate alignment and functional surfaces.

☐ Please have a Micromatic Field Engineer call.
☐ Please send Micromatic literature and case histories.

NAME_____

TITLE_____

COMPANY_____

STREET_____

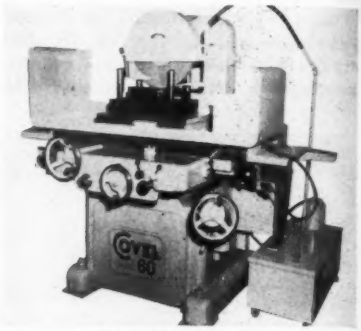
CITY_____ ZONE_____ STATE_____

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 164

ADAPTATION OF A STANDARD UNIT FOR SPECIAL APPLICATION

A customer of Covel Manufacturing Company wanted a grinder of sufficient size so that the guide pins need not be removed when grinding his dies. It is obvious that the wheel hood would have to be high enough to clear the guide pins to meet this condition.



Covel adapted one of their No. 60, 14″ x 20″ hydraulic surface grinders, that normally carries a 14″ dia wheel, to accommodate a 20″ wheel with a special wheel hood and spindle drive.

The illustration shows the conversion. It can be seen that there is sufficient clearance between the top of the guide pins and the bottom of the wheel hood.

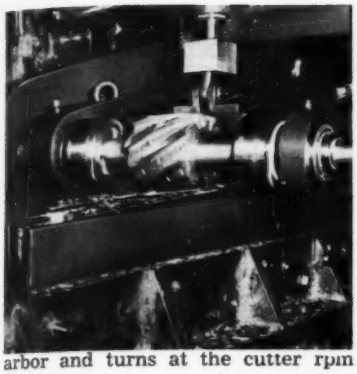
Rapid transverse traverse is also provided for quick positioning of the table or dressing the wheel from the chuck.

CUTTER CONTROLLED BY TEMPLATE GUIDED BEARINGS

Machining the same contour simultaneously on two SAE 4130 steel parts presented a tooling problem which was solved at Chance Vought Aircraft, Incorporated. Savings resulted from suggestions made by Goddard & Goddard Company, supplier of the milling cutter gang, concerning the use of a special bearing.

To machine the contour, a standard Cincinnati Horizontal Hydro-Tel was used, and a special head and auxiliary equipment was designed to permit close control over table rise and fall and changes of angles encountered in machining the parts. Templates of the contour to be reproduced acted as the guide.

In operation, the outer race of the Briney bearing rolls on and travels over the template while the cutter is taking an 0.030″ depth of cut at a 4 ipm feed rate. The inner race of the bearing is keyed to the cutter



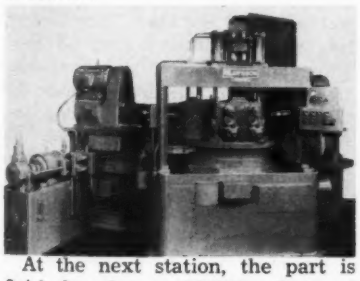
arbor and turns at the cutter rpm while the outer race turns at feed rate.

Cutter, bearings, and arbor assembly are mounted between two extended pivot arms attached to the standard machine overarm, and a belt from the machine spindle drives the cutters. As the table holding the parts moves into the rotating cutters, the entire unit swings freely, reproducing the desired contour. A pressure cylinder, coupled to the extended pivot arms supplies a constant downward force.

THREE-STATION TWO-WAY PRECISION BORING MACHINE

A special precision boring machine has been developed that performs multiple operations on automotive rear band servos.

In its operation two parts are loaded on the machine, and the clamp, start-cycle button is pressed. The machine then indexes to the next station where both parts are rough bored, grooved, and the angle is formed.



At the next station, the part is finish bored to ±0.0005". Rate of production, at 100% efficiency, is 220 pcs/hr.

The entire operation is controlled from one electrical pushbutton panel located at the front of the machine.

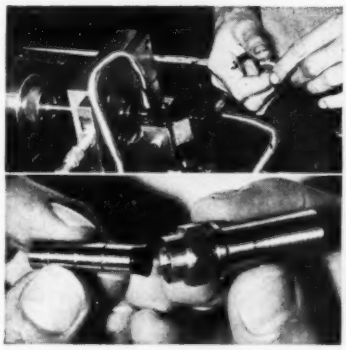
Engineering features include hardened and ground steel vee-ways, hydraulic tank and controls located outside the base for easy accessibility. All hydraulic and electrical circuits are to JIC standards.

The machine was designed and built by Olofsson Corporation.

HOW Manufacturers Use "150" HYDROHONER To Reduce Costs...Control Finish... Obtain Rapid Stock Removal

Leading Manufacturers of precision parts are using the low-cost "150" Hydrohoner to secure high production, rapid stock removal, geometrical precision and controlled surface finishes. Indicative of the versatility for application of this highly efficient honing machine are the following recent installations:

The crankpin bore of a compressor connecting rod is Microhoned on a "150" Hydrohoner within tolerances of .00015" for taper, and .0002" for size and out-of-roundness. From .0008" to .001" of stock is removed from the bore (.875" diameter x .43" long) in about 8 seconds, while obtaining an 8 Microinch finish.



In this installation, a "150" is Microhoning in two runs the bore (.313" diameter x 1.375" long) of a braking cylinder. The first run removes between .004" and .006" of stock in 30 to 35 seconds. During finishing run, the final .0005" to .0008" is removed to provide geometric accuracy within .0002" tolerance and an 8 Microinch or better finish. Precision and controlled finish of bore prevent hydraulic oil leakage and minimize wear of neoprene-cupped piston.

The principles and application of Microhoning are explained in a 30-minute, 16mm, sound movie, "Progress in Precision" . . . available at your request.

☐ Please send me "Progress in Precision" in time for showing on _____(date).
☐ Please have a Micromatic Field Engineer call.
☐ Please send Microhoning literature and case histories.

NAME _____
TITLE _____
COMPANY _____
STREET _____
CITY _____ ZONE _____ STATE _____

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 165

Business Management Aids

"A Preview of the Leisure Years" discusses the problems of retirement. It explores such subjects as general attitude toward retirement, the importance of developing potential useful activities, financial planning for the future, Social Security, and the protection of health. Retirement Education, Inc., Caxton Bldg., Cleveland 15, will supply copies of the bulletin, or—
Circle Inform-A-Gram No. F1.

Improve Employee Relations with the help of a brochure which tells how to establish a complete program of employee service recognition. Background for this material is the experiences of many companies with such programs. The brochure deals with the question, "Why service recognition at all?" Also discussed are service dinners, types of emblems to be used, and a widely and successfully used plan. For your copy of "How to Establish a Complete Program of Service Recognition," write to Elgin National Watch Co., Elgin, Ill., or—
Circle Inform-A-Gram No. F2.

Steel Office Furniture is the subject of a brochure which describes the "flight" line. Specifications for each type of desk are given along with pictures of the features of the products. Different types of drawers can be supplied with any of the models. The brochure is being distributed by Steelcase Inc., Grand Rapids, Mich., or—
Circle Inform-A-Gram No. F3.

A Comparison Chart for electric fork lift trucks helps in the evaluation and selection of various types and models. The chart enables users to survey simultaneously the operating, design, and maintenance characteristics of three different trucks by filling in appropriate spaces. Included are such items as turning radii, lifting and lowering speeds, fork elevations, collapsed heights, and types of controls. Contact Lewis-Shepard, 125 Walnut St., Watertown 72, Conn. for your copy, or—
Circle Inform-A-Gram No. F4.

The Electronic Data Processing System is explained in a booklet, "How the Computing System Works for You." The first part of the booklet describes the EDP units of the system, how each works, and

typical applications. Also explained are programming, the survey, progress charts, flow-charts, and instruction codes. Copies of Bulletin U-1275 are available from Remington Rand Univac, 315 4th Ave., New York 10, or—
Circle Inform-A-Gram No. F5.

Quality-Cost Poster samples are in a folder available from Elliott Service Co., Dept. 77, Mt. Vernon, N.Y. Special departmental quality control posters are a feature. The posters are available in 17" x 22" size and are colorful reminders to workers about quality control. Request copies of the folder from the company, or—
Circle Inform-A-Gram No. F6.

A Multiplying Model of the Comtograph that prints both factors and the right answer on two lines, has been announced by Comptometer Corp., 1735 N. Paulina St., Chicago 22. Model 220M has a dual-purpose lever which locks out printing during cycling. The final tape for the problem has only three figures on two lines. For straight addition the lever is flipped back to the adding position. Write to the company for information, or—
Circle Inform-A-Gram No. F7.

Save Money and Increase Efficiency in purchasing, sales, production, administration, and engineering by photocopying. A publication, "Verifax—Versatile Time-Saver for Busy Offices," describes the type of work which can be copied and the procedure used. Several models to meet different needs are discussed and pictured. Features and specifications are included. Obtain your copy from Eastman Kodak Co., Business Photo Methods Div'n., Rochester 4, N.Y.,
Circle Inform-A-Gram No. F8.

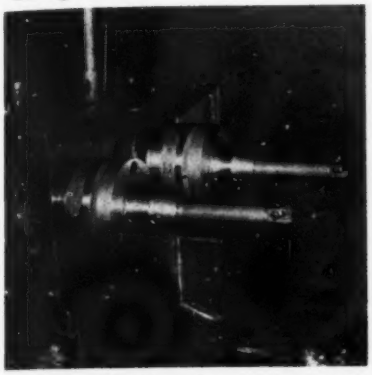
An Engineering Drawing Program, a comprehensive system for duplicating, filing, and safeguarding engineering drawings, is outlined in a bulletin. This system makes possible improved quality plus lower costs by saving time, personnel, filing equipment, and space. Other features of the system are given, in addition to an explanation of the aperture cards and microfilm used. Write to Recordak Corp., 415 Madison Ave., New York 17, for copies of this bulletin, or—
Circle Inform-A-Gram No. F9.

"The Greater Chicago Illinois Area Industrial Sites" is a booklet published by the New York Central System. Included is data on plant sites, labor, power, water, sewers, transportation facilities, and detailed maps of these locations. Area, topography, and taxes are given for four sites. This bulletin is made available by New York Central System, LaSalle Street Station, Chicago, or—
Circle Inform-A-Gram No. F10.

"The Complete Programmer" describes the programming and coding techniques for the Datatron 205, Datatron 220, and ElectroData 101. Flow Charts, coding sheets, and tips on the use of symbols and similar standardized procedures are also included. Copies of the booklet are supplied by ElectroData, Division of Burroughs Corp., 460 Sierra Madre Villa, Pasadena, Calif., or —
Circle Inform-A-Gram No. F11.

CARBIDE-ENCASED BORING BARS REDUCE MACHINING COST

Piloted boring bars are a common means of preventing deflection when straightening round holes or preventing cutting tool chatter. Although solid carbide bars are now reduced in cost, a greater reduction has been made by Kennametal Inc., through the development of carbide-encased boring bars. Their stiffness makes piloted bars unnecessary in many operations, and the core of softer metal has often been beneficial in reducing chatter.



The application shown represents the use of carbide encased bars to solve a machining problem involving diesel connecting rods and caps. Tolerances of +0.001", −0.000" were difficult to hold, and tool breakage and bar wear were excessive.

Using the carbide encased bar, tooling cost was reduced from 49¢ to 8¢ for the first 4423 pcs. Kendex insert tools had an average life of 70 holes/cutting edge for the rough cut compared to 10 holes for the old style piloted tools. For the finish cut, the insert did 80 holes compared to 30 by the former method.

The encased bar will last for many times the example given of 4423 pcs unless accidentally broken, and it can be set up on practically all types of machines.

CARBIDE NIB REDUCES COST OF SIZING

A tool cost saving in sizing 70,000 motor shaft holes in small stainless steel pump impellers resulted when punches formerly made of high-chrome, high-carbon steel were replaced by a punch tipped with a carbide nib. Figures reported by P. & W. Tool Co., Inc., indicate a reduction to approximately 2.2% of former cost, and savings are expected to continue as no sign of nib wear could be detected after sizing the 70,000 holes.

The operation, which is done by a nib made by Kennametal Inc., employs a 180-ton Toledo straight side type punch press. The hole in the stainless steel part is increased from 0.442" to 0.502" in order to provide a press fit on a shaft. Sohio drawing compound and Sulkeer mixed to paste consistency is used as a lubricant.

Steel punches good for 4000 pcs cost $62.75. 20 polishings required to remove gall marks cost $40.00, and press downtime accounted for $26.67. Total cost was $129.42 for 4000 pcs or $2,264.85 for 70,000 pcs.

This compares with $50.00 for the pro-rated Kennametal punch, which is good for at least three times the 70,000 sizing operations. No maintenance or downtime was required.

Monarch Precision SHAPLANE Radius Tools
Illustration shows convex cutter for ¼" to 2½" balls.
FIVE MODELS for LATHES, SHAPERS, PLANERS, BORING MILLS
Range ½" to 3" for concave Radii. Also heavy duty models for radii to 6" on planers, etc.
PATENT PENDING
Write for circular
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1221 W. Addison St., Chicago 13, Ill.

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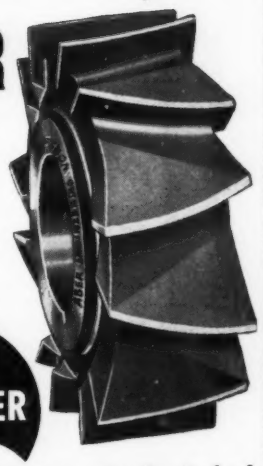
EXTEND CUTTER LIFE *Shear Metal* with



ABER
CURVED TOOTH milling cutters
END CHATTER

● Give More Accurate Control of Limits and Finish ● Elimination of Chatter and Breakage ● Extended Cutter Life ● Better Performance ● Increased Production

FREE DATA — 24 page catalog on milling with ABER Cutters.

ABER ENGINEERING WORKS
WATERFORD, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 1672

SPEEDS UP PRODUCTION
CUTS COSTS

ENCO
Self-Indexing HEXTURRET

Convert your lathes for turret work this quick, easy way. ENCO HEXTURRET gives you the *accuracy*, *rigidity* and *speed* you need to step up lathe production and cut "per piece" costs. Easy as mounting your lathe tailstock. Does both normal and heavy lathe and screw machine work, drilling, counter boring, counter sinking, spot facing, reaming, turning, boring, etc. Fit all lathes 9" to 16" swing.

Mail coupon for cat. #53 and name of nearest Enco Franchise Dealer.

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PRECISION ENCO ECONOMY

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Chicago 39, Dept. 738

Please send catalog #53 and full details of ENCO HEXTURRETS.

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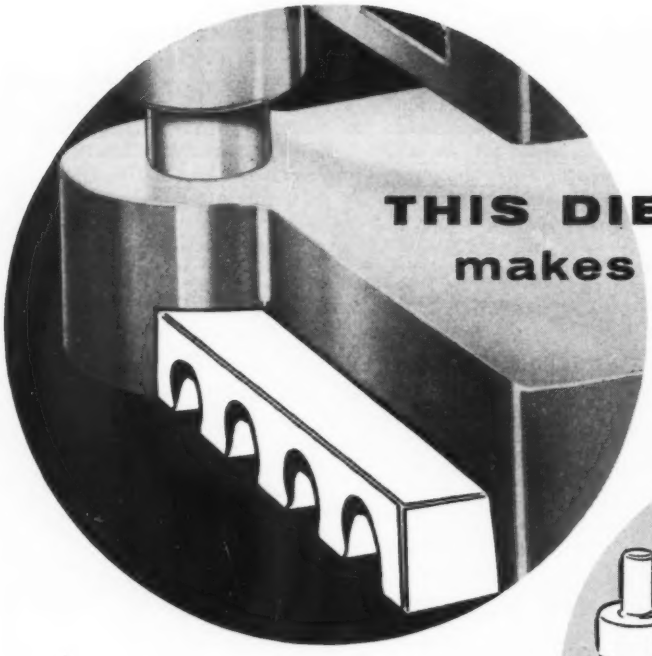
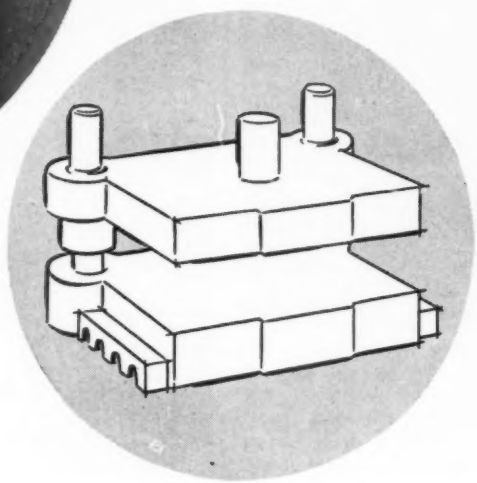
CIRCLE INFORM-A-GRAM KEY NO. 1673



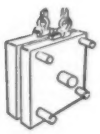
THIS DIE SET FEATURE
makes money for you



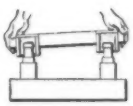
Additional Superior Features that speed handling, lower die making costs.

SAFETY FLANGE
protects fingers by providing roomy gripping space on either side of the die shoe.

LOCK-JAW LIFTING DEVICE
removes the danger of handling large die sets.



E-Z LIFT SLING CHAIN
attach to the lock-jaw for immediate lifting.



"REMOVABLE CAP" PINS
End troublesome binding in parting dies.

LIMITLESS RANGE OF DIE SET SIZES JIG BORED TO YOUR SPECIFICATIONS . . .

Competitively priced in all given sizes.

SUPERFINISH GUIDE PINS ON ALL SUPERIOR DIE SETS

Maximum Surface Hardness, Increased Bearing Surface,
Longer Pin and Bushing Life,
Smoother Action

SUPERIOR SAFETY FLANGES

Exclusive on all Superior Die Sets

Just one of many Exclusive Superior Die Set Features that save time, cut your die making costs and build your profits. Safety Flanges protect fingers by providing roomy gripping space on either side of the die shoe. Combined with Superior's LOCK JAW LIFTING DEVICE it permits lifting of small and large sets quickly, safely and easily. Large sets need not be blocked for handling. Truly a time and money saver in your shop.

Our 35 years of engineering experience are at your disposal, write today for 32 page catalog giving complete details or call one of the expert representatives in your area.

For fast local service call these Superior Representatives.

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Winter Park, Fla. 4-0464
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Agawan, Mass. Republic 9-1132
Brooklyn, N. Y. Esplanade 6-1368
Cheshire, Conn. Browning 2-4887
Warwick, R. I. Turner 4-2907

SUPERIOR STEEL PRODUCTS CORP.
2754 S. 19th ST., MILWAUKEE, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 168

THROW - AWAYS SPEED PRODUCTION, CUT COST

A change to carbide throw-away tooling multiplied the speed of this face milling operation 10 times, with twice the feed, and cut tool cost from 51¢ to 4¢/pc. Blade regrinding time and cost were eliminated and blade changing downtime was greatly reduced, thanks to the throw-away insert tooling, reports Kennametal Inc.

Five steel pads, welded to a countershaft bracket (see illustration), are milled with a 6" dia cutter. Kendex style KSBR-12 tools with Grade K21 carbide square inserts are now used in place of the 12 inserted high-speed-steel blades formerly used.

The eight indexable edges of each of the six $103 Kendex inserts face 280 brackets (1400 pads) without regrinding. With the HSS blades, blade and grinding cost to mill 210 brackets amounted to $108, or 51¢/pc.

Operational data, using the throw-aways, is as follows: A No. 5 G&L horizontal boring mill, with 15-hp motor, is used. Feed for the carbide operation is 7.5 ipm; speed, 375 rpm, and 595 sfpm; and depth of cut, 9/64".

Both 4' and 5' bed models of the 11" metalworking lathes are now available from Rockwell Mfg. Company's Delta Power Tool Division. They feature flame-hardened bed ways for longer life and added wear resistance. They are designed for use in machining materials that produce hardened chips or dust with abrasive qualities, and for use in shops in which standard bed ways may be chipped, dented, or scored by dropping of tools.

Multi-exposure shot showing "PERMANENT" mounted prism being crashed into a piece of wood. Bond was not affected in any way. Your AO Sales Representative will perform this demonstration right before your eyes.

YOU CAN PAY MORE BUT YOU CAN'T BUY BETTER...

AMERICAN-MADE AO SPENCER CYCLOPTIC STEREOSCOPIC MICROSCOPES START AT A LOW $189.00*

This stroboscopic photograph shows the amazing holding power of the specially developed "PERMANENT" bonding agent used to mount prisms in the new AO Spencer Cycloptic Stereoscoptic Microscopes.

This method of prism mounting means you can put your Cycloptic to extreme use . . . attachment to a vibrating production machine, rough and tumble field trips, even years of student handling . . . and still be assured of positive, permanent prism alignment.

This careful attention to detail is typical of the thoroughness that marked every step of the development of this instrument. Enthusiastic users tell us we have achieved our goal of top quality at a low, low cost.

The entire AO Spencer Stereoscopic story is yours for the asking. Mail coupon below for handsome 36 page brochure which gives complete specifications.

*MODEL 56F-1, in quantities of 5 or more

American Optical Company
INSTRUMENT DIVISION, BUFFALO 15, NEW YORK

! Dept. C179
Gentlemen:
Please send me AO Spencer Cycloptic Brochure SB56-856.

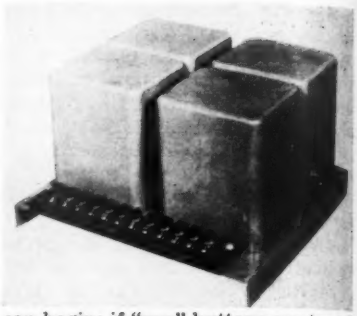
Name_____
Address_____
City_____ Zone____ State____

CIRCLE INFORM-A-GRAM KEY NO. 169

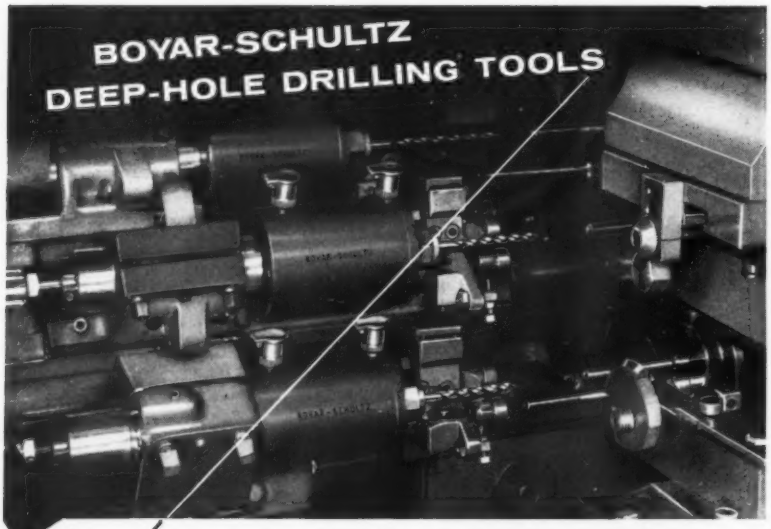
ANTI-REPEAT PRESS SAFETY DEVICE HAS NO MOVING PARTS

An anti-repeat press control with no moving parts, for use with its Type "PV" protector air valve, has been announced by the Clark Controller Company. Instead of relays, the device utilizes magnetic amplifiers, diodes, a transistor, and a pulse transformer. It has no moving parts subject to inspection and maintenance, and is not submitted to wear, corrosion, or dust interference.

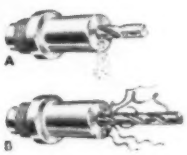
This "Transmag" control has external connections essentially like those of conventional anti-repeat press controls, and operates on 115-V ac power. It is essentially a safety device between the operator's control buttons and the press, and prevents operation of the press unless safe conditions exist. All "run" buttons must be depressed before a press stroke can begin and must be held down until the press downstroke is nearly completed. "Run" buttons must be released and depressed again before a new stroke



can begin; if "run" buttons are taped or jammed down, the press will stop at the end of its cycle.



for Multiple Spindle Automatics



A. When using Boyar-Schultz Deep Hole Drilling Tool

B. Without using Boyar-Schultz Deep Hole Drilling Tool

NEW Boyar-Schultz Tools that bring into range, many deep-hole drilling jobs previously regarded as impractical or even impossible.

Oscillating action breaks long stringy chips into fine granules. This eliminates drill breakage, promotes finer finishes, closer tolerances, better concentricity and affords faster cycle time.

The Boyar-Schultz Corporation is offering their engineering services and recommendations for installation, to interested companies at no charge, anyone interested in this free engineering service is asked to write, furnishing a layout or sketch of the piece part as well as type of material and other pertinent data.

BOYAR-SCHULTZ CORPORATION

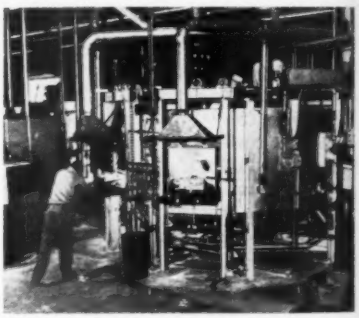
2012 South 25th Avenue Dept. SMT Broadview, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 170

CIRCULAR FURNACE OFFERS BOTH PREHEAT AND HIGH HEAT TREAT

A high production heat treating furnace that performs both preheat and high heat operations was recently put into operation at The Fafnir Bearing Company.

The furnace was designed by Holcroft & Company in conjunction with Fafnir metallurgical engineers, for processing high speed type steel ball bearing rings. Material of this kind calls for a preheat at temperatures ranging from 1400° to 1700°F, followed by a high heat ranging from



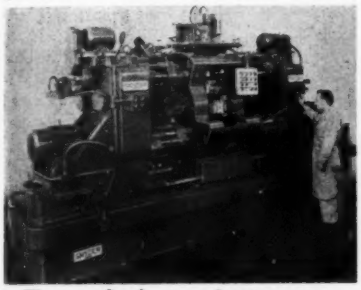
2000° to 2400°F. Formerly these two operations were performed in two separate furnaces. Now the entire cycle is accomplished in one. As a result, not only has heat treat quality improved, but there has been a reduction in labor and floor space required.

The furnace is a doughnut-shaped rotary hearth type with separate charge and unload doors, and can produce over 400 lbs/hr of treated work. The hearth is of refractory construction and has an effective heating width of 2'. Rotation speed of the hearth is variable and the movement is adjustable for either continuous or indexing operation.

SEMI-AUTOMATED MACHINE DRILLS, REAMS, CORE DRILLS, AND TAPS

The ability of a semi-automated special machine to process a variety of low-production parts is illustrated by a two-way, five-station, trunnion-type special machine that drills, core drills, reams, and taps four different groups of more than 58 coal mining machine rock bit holder parts.

Designed and built by Snyder Tool and Engineering Company, the machine has work fixtures mounted on a trunnion that is indexed to five positions between opposed standard way-type machining units. One machining unit has a nine-spindle head and a single-spindle lead-screw tapping unit, and the other has a 10-spindle head and single-spindle lead-screw tapping unit. Holes up to 1½" dia are drilled and reamed in the parts.



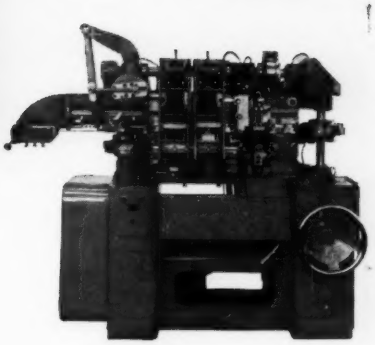
The new Snyder trunnion-type special machine that drills, core drills, reams and taps 58 different coal mining machine rock bit holder parts.

The variations in the four groups of steel parts processed by the machine lie in their size and shape, number of holes, hole location, and hole sizes. The part size and shape variations are accommodated by interchangeable fixture details. The variation in hole numbers is handled by utilizing two-position fixtures. A part is put in one fixture position and indexed through four machining stations, then put in the other position and indexed through four more machining stations. Some machining stations are idle for some parts.

Variations in hole locations are provided for by three removable, interchangeable, two-spindle heads on each of the main heads of the machine. The heads are interchanged to accommodate proper center distance specifications for the various parts. Variations in hole sizes are taken care of by changing tools that are mounted in adjustable adapter assemblies in the spindles. These adapter assemblies permit adjustment of tools for length.

. . . *Continued on page 173*

THE FIRST ENTIRELY NEW FOUR-SLIDE IN FIFTY YEARS!



A development of industry-wide importance is the Torrington Verti-Slide—a new vertical 4-slide that is the first major innovation in the basic field of wire and strip forming equipment in half a century!

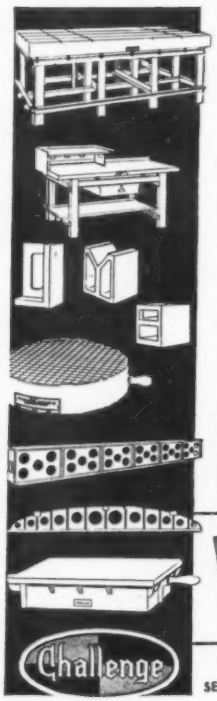
The Verti-Slide was designed to meet a serious need for greater versatility, lower tooling cost, faster set-up time and reduced floor space. We urge you to investigate the new Torrington Verti-Slide in detail.

THE TORRINGTON MANUFACTURING COMPANY

TORRINGTON, CONNECTICUT • VAN NUYS, CALIFORNIA • OAKVILLE, ONTARIO

CIRCLE INFORM-A-GRAM KEY NO. 171

Over 300 types and sizes of PRECISION SURFACES for LAYOUT INSPECTION and ASSEMBLY



Close tolerance precision work demands Precision Surfaces, and Challenge offers the world's widest line of standard precision surface equipment. In addition, if your requirements include large, special surface or floor plates (in Semi-Steel or Granite), Challenge's Custom Engineering can plan and produce them for you.

ASK FOR LATEST CHALLENGE CATALOG SHOWING THE MOST COMPLETE LINE OF

Angle Plates	Surface Plates	Straight Edges
V-Blocks	Floor Plates	Welding Tables
Box Parallels	Lapping Plates	Layout Plates
Angle Irons	Bench Plates	Work Benches

Handy new Catalog No. 838-W includes complete specifications and prices. See your Industrial Distributor or write Challenge for your free copy. Write Dept. TP-3

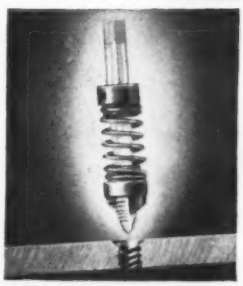
THE CHALLENGE MACHINERY COMPANY
SE-110 **Grand Haven, Michigan**

CIRCLE INFORM-A-GRAM KEY NO. 1721

TAP AND DEBURR IN ONE OPERATION

Slip a BURR-BIT onto any make tap and holes are automatically deburred while they are being tapped. Save money, time and labor by COMBINING TWO OPERATIONS INTO ONE.

AS TAP IS WITHDRAWN, BURR-BIT DEBURRS, LEAVING CLEAN CHAMFER



First thread which creates burr, has been AUTOMATICALLY, QUICKLY AND PRECISELY REMOVED, leaving perfectly smooth finish for easy screw insertion.

Precisely engineered of finest quality high speed tool steel for use on almost every material. The BURR-BIT is used by many large and small manufacturers throughout the country.

For full information and specifications on the BURR-BIT, write to

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tap more *Accurate* pieces per hour

with a PROCUNIER TAPPING HEAD!

There's an *extra quality* built into each Procunier tapping head that is automatically reflected in the work produced. They are *precision* units — with the most advanced engineering improvements. In shop after shop — the reaction is the same — "Procunier heads are producing *better, faster, longer*, with *fewer* rejects, *fewer* spoiled pieces".

Procunier heads are noted for their *superior quality*. They offer a new double cone cork faced friction clutch for positive "controlled" driving with finger tip pressure; soft cushioned driving action, ball bearings for smoother, faster operation; heat treated gears; and special balanced reversing mechanism; plus many others. It all adds up to *more* production, *better* production, for *longer* periods, for *less*.

Write for FREE Brochure
giving full details and specifications on the Procunier line of tapping heads.

PROCUNIER SAFETY CHUCK CO.
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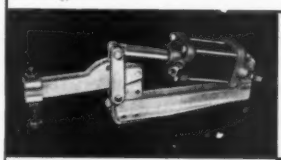
You asked for it . . .

KNU-VISE has come up with it!



TWO NEW AIR-OPERATED CLAMPS with 800 pound clamping force

AO-800 CLAMP

AODT-800
DOUBLE TOGGLE CLAMP

Because you asked for it, Lapeer's vast line of Knu-Vise clamps now features four distinct groups of air-operated clamps. Two new 800 lb. air clamps have been added to the widely accepted 200, 400 and 1200 lb. air clamps, thereby rounding out the Knu-Vise series. The Model AO-800 clamp is for conventional holding operations—the Model AODT-800 for those difficult mounting situations.

For complete information on these units and the more than 150 other models available, write for catalog today!

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS **LAPEER MANUFACTURING CO.**
3064 DAVISON ROAD • LAPEER, MICHIGAN
WESTERN DIV.: 419 Magnolia, Glendale, Calif.
CANADIAN DIV.: Higginson Equipment Sales, LTD., Burlington, Ontario

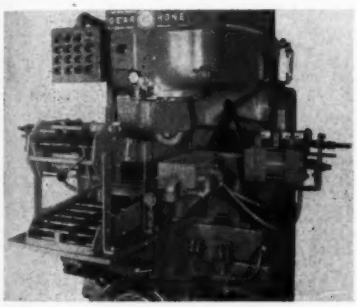
CIRCLE INFORM-A-GRAM KEY NO. 1724

. . . Machine from page 171

When the machine has been set up for a specific group of parts, a part is loaded in the first station and a button is pushed. The two heads advance for the machining operation and retract. As the heads retract, the trunnion indexes ("down and away" from the operator) to the next station. Operation of the pushbutton again causes the heads to go through their advance and retract sequence. A finished part is produced with each index of the trunnion (except in the case of parts that are processed through the sequence twice).

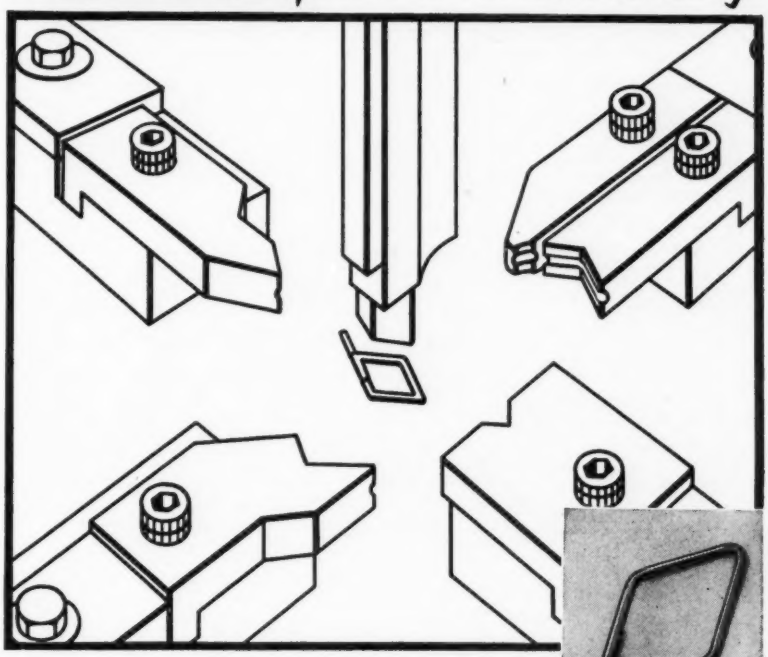
ROCKER TYPE LOADER HANDLES LONG-SHAFT UNSYMMETRICAL GEARS

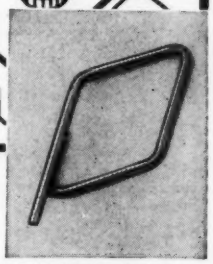
A rocker-type Red Ring automatic loader for handling long-shaft, unsymmetrical gears on both gear tooth honing machines and rotary gear shaving machines has been developed by National Broach & Machine Co. The loader has a built-in gaging device, magazine feed, air-powered rocker-type loading mechanism, and a discharge chute that feeds finish-honed parts to unloading position in front of the operator.



An assembly of lever-type grip fingers in both input magazine and discharge chute keeps the gears from touching each other and avoids the cocking of parts that can result from the effect of the greater weight at one end of the workpiece. The rocker-type unloader mechanism requires minimum maintenance and is practically unaffected by chip conditions. Operation of the loader is entirely automatic when used in conjunction with standard gear tooth honing machines or rotary gear shaving machines equipped with suitable controls and air-powered head and tailstocks. The operator merely keeps the input magazine full of gears and removes finished gears from the exit chute. The loader is also adaptable to fully automated lines.

NILSON 4-SLIDES FORMING PRODUCTION PROFITS... Automatically





16,000 PARTS PER HOUR on a NILSON Automatic 4-SLIDE

PRODUCT: Deadlock Hook
MATERIAL: Soft Basic Wire
PRODUCTION: 280 Pieces Per Minute
MACHINE: No. S-0 Nilson 4-Slide

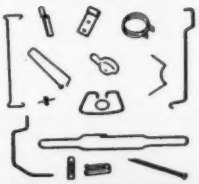
Whether your product is formed simply . . . or requires complex bending in several planes . . . a Nilson 4-Slide may be the solution to your production problems.

The sketch above shows the tooling used by a leading manufacturer to mass-produce metal hooks—at the rate of 280 pieces per minute! A Nilson 4-Slide has proved to be the most efficient, economical way to manufacture this product . . . and many other kinds of wire forms and small metal stampings.

Manufacturing costs must be kept down to meet today's competition. The combination of high speed and product uniformity—basic advantages of Nilson 4-Slides—means maximum production, minimum operating costs.

Before you design, tool, or specify manufacturing methods for your product, get in touch with Nilson. Over 60 years of experience with wire and metal forming applications can help you form better products . . . more profitably.

SIZE RANGES:
Wire up to ½" diameter
Ribbon stock to 3½" wide
Feeds up to 32"
5 TO 75 TON PRESS SECTIONS



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AUTOMATIC WIRE & RIBBON METAL FORMNG 4-SLDE MACHINES • WIRE & STOCK REELS • WIRE STRAIGHTENING EQUIPMENT • AUTOMATIC STAPLE FORMING MACHINES • SPECIAL WIRE FORMING EQUIPMENT

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TECHNICAL BOOKS

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WATER-HYDRAULIC EXTRUSION PRESS USED FOR ALUMINUM

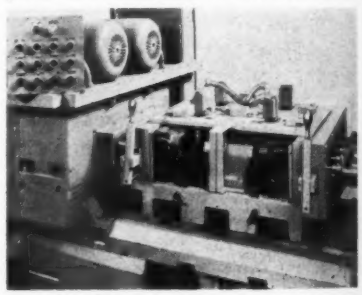
An automatically sequenced water-hydraulic extrusion press is now in operation at Kaiser Aluminum & Chemical Corporation. It was designed and built by Birdsboro Steel Foundry & Machine Company to extrude a broad range of aluminum tube sizes and assorted shapes.

The main ram of the press exerts a force up to 3500 tons, while maximum force of the mandrel piercer is 250 tons. The ram, mandrel piercer, container, gate locks, and shear are all operated by water at 4250 psi. The billet loader and die carrier, however, are oil hydraulically operated at 750 psi.

The press is so designed that it can be operated automatically or manually to extrude billets 9" to 12" in dia and up to 36" in length. It can be run on automatic cycle up to any desired point in the process and then operated manually. Moving components are electrically interlocked to prevent out-of-sequence operation during the automatic cycle, or carelessness in manual operation.

CONCENTRICITY IS FEATURED IN DUAL CAPACITY MACHINE

Concentricity of valve seats and guide holes in automotive cylinder heads is achieved with a Style 17-A standard precision boring machine manufactured by the Ex-Cell-O Corporation. Tolerance is held to 0.001".



Functioning in a dual capacity, the unit feed plunge-faces the intake and exhaust valve seats and Bor-Drils the valve guide holes from the solid. Net production is 23 cylinder heads/hr and, except for loading and unloading, the machine cycle is completely automatic.

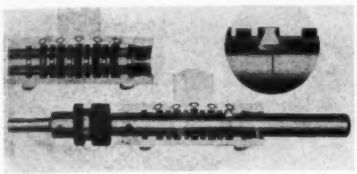
The cylinder heads are hydraulically clamped in a two-compartment fixture mounted on the machine table and independent loading and unloading of the fixture permits continuous machine operation.

"NOBUR" = NO BURRS

When burrs are found in unusual and highly restrictive locations, their removal is made easy by using this adaptation of Nobur Manufacturing Company's standard Nobur tool.

Applicable to the manufacture of hydraulic controls as well as many components of rockets and missiles, this new tool development offers controlled deburring and chamfering of internal annular grooves about a central bore of not less than 3/16" dia.

Two essential factors are combined to permit successful application of the tool to the machining of specified chamfers as measured from the actual planes of the grooves. One is the established Nobur operating principle involving a cutter which can be mechanically projected beyond and



This Nobur tool makes easy the deburring and chamfering of the edges of internal grooves where a precision finish is specified.

retracted into a cylindrical pilot at the will of the operator. Thus it may be readily positioned within a specific internal area. Secondly, this same operating principle offers a cutter which is securely locked when in its projected position; thus the angular grind (or form) of the cutter is imparted to the workpiece.

For application to a groove, the cutter is formed with an integral non-cutting guide extending beyond the cutting edges. This is necessarily somewhat narrower than the groove so that, with the workpiece roughly pre-positioned, the cutter will readily enter the groove when projected by the operator's manipulation of the knurled sleeve. Axial movement of the workpiece then produces a chamfer.

Pre-positioning of the workpiece may be facilitated by guide lines marked on cylindrical pilot of the tool. The Nobur tool may be used in a lathe, drill press or hand drill. The standard pilot is 3/16" dia. Special 3/32" pilots are made on special request. The standard tool maximum diameter is 1", but they are available for or can be adapted to almost any size requirement.

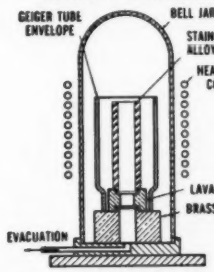
Nobur Manufacturing Company, 6860 Farmdale Avenue, North Hollywood, California, will send illustrated bulletin, AHA-41, upon request, or — **Circle No. D1.**

The Lepel Line of induction heating equipment represents the most advanced thought in the field of electronics as well as the most practical and efficient source of heat yet developed for industrial heating.

If you are interested in induction heating you are invited to send samples of the work with specifications. Our engineers will process and return the completed job with full data and recommendations without any cost or obligations.

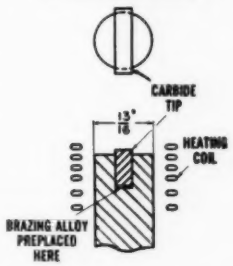
TYPICAL INDUCTION HEATING APPLICATIONS

METAL VAPOR COATING



The manufacture of Geiger Tubes requires a vapor coating of stainless steel inside of the glass envelope. The glass envelope is positioned inside of a bell jar which is connected to evacuation equipment. After evacuation, induction heating coil-shown in position over bell jar heats the stainless steel source to high temperature causing vaporization. Condensation occurs on glass walls of the tube.

CARBIDE TIPS BRAZED TO GRANITE DRILLS



The drawing shows a cabride tip being brazed in the milled recess of a drill. High temperature brazing alloy is preplaced as indicated. Proper spacing of the turns of the heating coil extends the transition zone to avoid metallurgical notch and thereby fatigue failure. In a production set-up, the heating cycle can be pre-set so that every drill will be uniformly processed.

SELECTIVE HARDENING OF RAIL GROOVE

V-grooves in steel rails are selectively hardened by the coil shown. Heating and quenching occur progressively as the rail moves through the coil and a quench ring.

Electronic Tube Generators from 1 kw to 100 kw.
Spark Gap Converters from 2 kw to 30 kw.

WRITE FOR THE NEW LEPEL CATALOG . . . 36 illustrated pages packed with valuable information.

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CUMULATIVE EDITORIAL INDEX FOR 1958 ISSUES

TOOLING & PRODUCTION Magazine

The number of subjects in which T&P's editors present material in just a few issues adds up very rapidly. Most articles are of lasting interest and have future reference value in solving tooling and production problems.

This cumulative index will build up progressively during each calendar year. Each issue will carry a cumulative index of material contained in all previous issues of the same year, with each January issue carrying the complete index of the twelve issues of the previous year.

We suggest you see to it that your copies of T&P are retained for future reference so you can get the full benefit of this new, unique and useful index.

The Publisher

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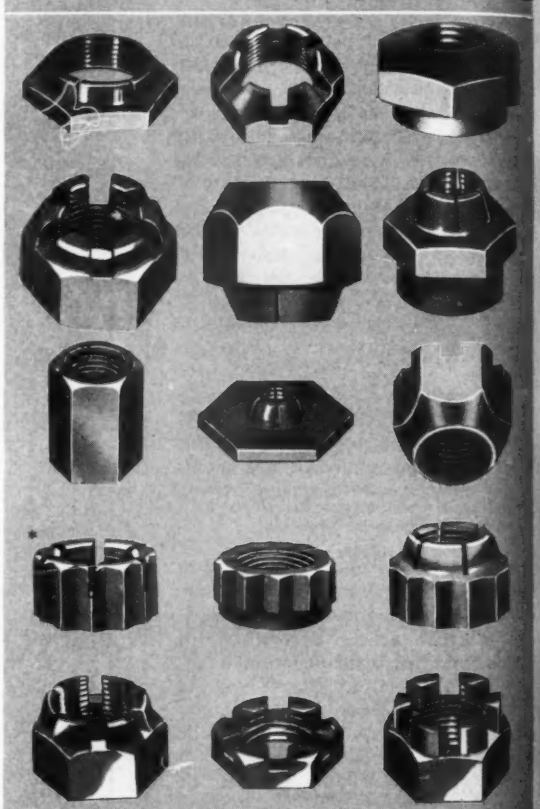
special machines + large stock of material x years of experience = speedy deliveries high quality low prices



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*12 Pointer Standards, sizes: ¼" to ¾"—brochure on request

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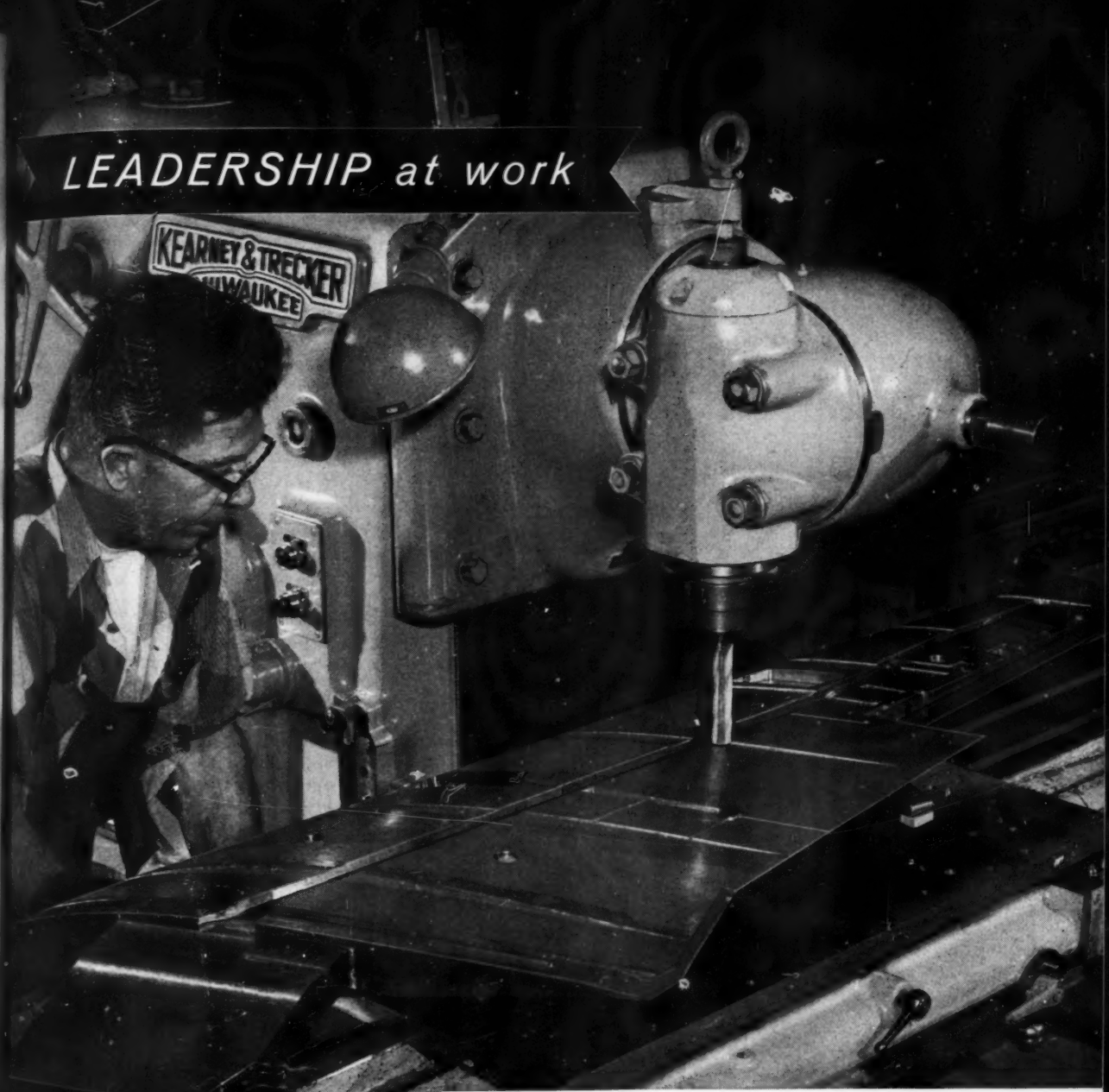
LEADERSHIP at work



TF Series mill speeds DC-8 Jetliner toward take-off With G. L. Lyons at the controls, this Kearney & Trecker-Milwaukee Model 650 TF Series mill helps usher in the jet era of air transport. It's shown performing a precision milling operation on a stainless steel wing section for the wind-tunnel model of Douglas Aircraft's new DC-8 Jetliner. The 650 TF machine is just one of 48 models in the only knee-type line in the world with twin elevating screws.

KEARNEY & TRECKER MILWAUKEE

6776 W. NATIONAL AVE., MILWAUKEE 14, WIS.

Kearney & Trecker staff photo by Ron Johnson

K&T's man on the job . . .
D. E. (Tobey) Tobias of Moore Machinery, Los Angeles—helped Douglas in their selection of several TF's. *For expert milling counsel, call the K&T man near you. And remember to ask him, or write direct, for free, comprehensive catalog.*

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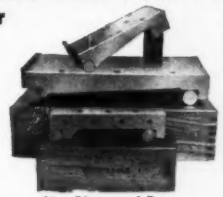

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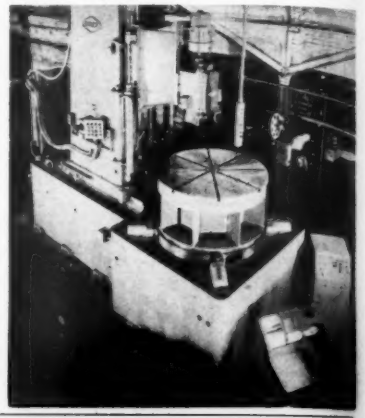

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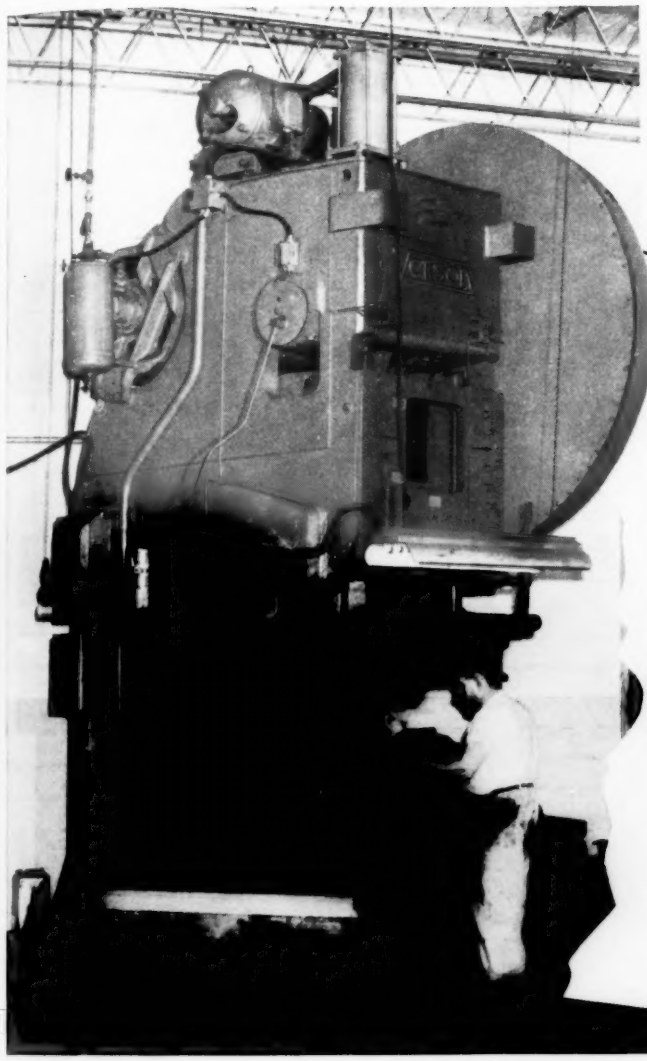

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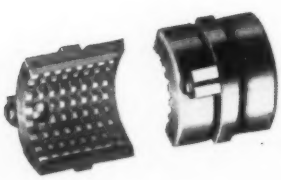

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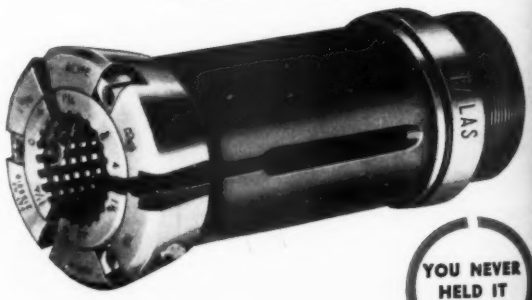

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